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PATENT ABSTRACTS OF JAPAN

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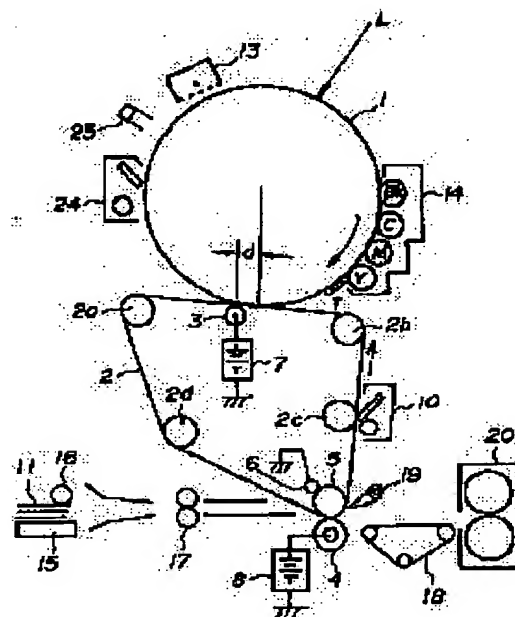
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(54) IMAGE FORMING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain a transferred image of high image quality by arranging a transfer means on the downstream side adjacent to an area where a latent image carrier comes into contact with a belt member.

SOLUTION: A primary transfer roll 3 is separated from the center of the contact part (nip part) of the photoreceptor drum 1 and the intermediate transfer belt 2 by (d) (2 to 4mm) to the downstream s



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CLAIMS

[Claim(s)]

[Claim 1] Latent-image support which forms a latent image according to a picture signal, and a developer which develops said latent image with a predetermined toner, A belt member contacted and arranged in a part at said latent-image support and said latent-image support of said belt member are image formation equipment which possesses at least an imprint means to make a toner image which has been arranged in the opposite side and supported by said latent-image support transfer to said belt member side. Said imprint means Image formation equipment characterized by having arranged on a lower stream of a river close to a surface of action of said latent-image support and said belt member.

[Claim 2] Image formation equipment characterized by installing said imprint means in a location in contact with said belt member in claim 1.

[Claim 3] Image formation equipment characterized by said imprint means being a transfer roller in claim 2.

[Claim 4] Image formation equipment characterized by having arranged said belt member on a share tangent of said latent-image support and said imprint means in claim 3.

[Claim 5] Image formation equipment characterized by installing said imprint means in a location which counters by non-contact [said / belt member and non-contact] in claim 1.

[Claim 6] Image formation equipment characterized by said imprint means being a transfer roller in claim 5.

[Claim 7] Image formation equipment characterized by said imprint means being corotron in claim 5.

[Claim 8] Image formation equipment characterized by making contact pressure of said latent-image support and belt member into 10 thru/or 20 g/cm in claim 1.

[Claim 9] Image formation equipment characterized by setting distance with a center of a point of contact of a center of a point of contact of said latent-image support and said belt member, said belt member, and said imprint means, or a center of the point approaching [non-contact opposite] to 2 thru/or 4mm in claim 1.

[Claim 10] It is image formation equipment characterized by making the belt member concerned come to contact said electrostatic latent-image support by contacting said imprint means by pressing in said belt member while a field where said belt member counters with said electrostatic latent-image support in claim 2 is laid by firm-bridging means in the electrostatic latent-image support concerned and the non-contact condition.

[Claim 11] Image formation equipment characterized by setting a gap of said belt member and said imprint means to less than 100 micrometers in claim 5.

[Claim 12] Image formation equipment characterized by installing a baffle plate which intercepts electric-field invasion to a contact initiation field of said electrostatic latent-image support and said belt member to the migration direction upstream of said belt member of said corotron, and the belt member concerned which counters in claim 7.

[Claim 13] Image formation equipment characterized by constituting said imprint means from a metal roll in claim 11.

[Claim 14] Image formation equipment characterized by having a high resistance resin layer on

the surface of said metal roll in claim 13.

[Claim 15] It sets to claim 3 and a volume-resistivity value of said imprint means is 104. Or 109 Image formation equipment characterized by considering as $\omega\text{-cm}$.

[Claim 16] A photo conductor drum which forms a latent image according to a picture signal, and a color developer which develops said latent image with a predetermined color toner, A middle imprint belt which carries out the sequential imprint of the toner image of each color by which has been arranged so that a part may be around contacted and gone to said photo conductor drum, and sequential formation was carried out for every color at said photo conductor drum, and is supported as a full color toner image, A secondary transfer roller which carries out the package imprint of the full color toner image supported by said middle imprint belt at a record medium, It arranges on a lower stream of a river close to a surface of action of said photo conductor drum and said middle imprint belt. And by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a toner image support side of said middle imprint belt Color picture formation equipment characterized by having at least a primary transfer roller by which contact arrangement was carried out with said middle imprint belt which forms imprint electric field between said latent-image support, and imprints said toner image primarily to said middle imprint belt.

[Claim 17] A photo conductor drum which forms a latent image according to a picture signal, and a color developer which develops said latent image with a predetermined color toner, A middle imprint belt which carries out the sequential imprint of the toner image of each color by which has been arranged so that a part may be around contacted and gone to said photo conductor drum, and sequential formation was carried out for every color at said photo conductor drum, and is supported as a full color toner image, A secondary transfer roller which carries out the package imprint of the full color toner image supported by said middle imprint belt at a record medium, It arranges on a lower stream of a river close to a surface of action of said photo conductor drum and said middle imprint belt. And by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a toner image support side of said middle imprint belt Color picture formation equipment characterized by having at least said middle imprint belt with which imprint electric field are formed between said photo conductor drums, and said toner image is primarily imprinted to said middle imprint belt, and a primary transfer roller arranged non-contact.

[Claim 18] A photo conductor drum which forms a latent image according to a picture signal, and a color developer which develops said latent image with a predetermined color toner, An imprint belt which conveys a record medium which imprints said predetermined color toner image which has been arranged so that a part may be around contacted and gone to said photo conductor drum, and was formed in said photo conductor drum, It arranges on a lower stream of a river close to a surface of action of said photo conductor drum and said imprint belt. And image formation equipment characterized by having at least a transfer roller by which contact arrangement was carried out with said imprint belt which forms imprint electric field between said photo conductor drums by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a record-medium installation side of said imprint belt.

[Claim 19] A photo conductor drum which forms a latent image according to a picture signal, and a color developer which develops said latent image with a predetermined color toner, An imprint belt which conveys a record medium which imprints said predetermined color toner image which has been arranged so that a part may be around contacted and gone to said photo conductor drum, and was formed in said photo conductor drum, It arranges on a lower stream of a river close to a surface of action of said photo conductor drum and said imprint belt. And image formation equipment characterized by having at least said imprint belt with which imprint electric field are formed between said photo conductor drums by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a record-medium installation side of said imprint belt, and a transfer roller arranged non-contact.

[Claim 20] Two or more photo conductor drums which form a latent image according to one each of the picture signals of two or more colors, respectively, Two or more color developers which are formed in each of two or more of said photo conductor drums, and develop each latent image

with a predetermined color toner, An imprint belt conveyed so that each color toner image which has been arranged so that it may contact and a part may be around gone to each of said photo conductor drum, and was formed in each of said photo conductor drum may be imprinted in piles one by one, It arranges on a lower stream of a river close to each surface of action of said each photo conductor drum and said imprint belt. And by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a record-medium installation side of said imprint belt Color picture formation equipment characterized by having at least two or more transfer rollers by which contact arrangement was carried out with said imprint belt which forms imprint electric field between said each photo conductor drum, respectively.

[Claim 21] Two or more photo conductor drums which form a latent image according to one each of the picture signals of two or more colors, respectively, Two or more color developers which are formed in each of two or more of said photo conductor drums, and develop each latent image with a predetermined color toner, An imprint belt conveyed so that each color toner image which has been arranged so that it may contact and a part may be around gone to each of said photo conductor drum, and was formed in each of said photo conductor drum may be imprinted in piles one by one, It arranges on a lower stream of a river close to each surface of action of said each photo conductor drum and said imprint belt. And by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a record-medium installation side of said imprint belt Color picture formation equipment characterized by having at least said imprint belt with which imprint electric field are formed between said each photo conductor drum, respectively, and two or more transfer rollers arranged non-contact.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to the image formation equipment which imprints the non-established toner image which was applied to image formation equipments, such as a copying machine of an electrophotography method, and a printer, especially was formed on latent-image support through a direct or belt-like middle imprint object at a record medium to the record medium conveyed by the belt member.

[0002]

[Description of the Prior Art] As the imprint method in image formation equipments, such as a copying machine of an electrophotography method, and a printer The method which imprints directly the toner image formed on latent-image support, such as a photo conductor drum, to the record medium conveyed with a belt-like conveyance object, After imprinting primarily the toner image formed on latent-image support on the middle imprint object which once consists of a belt member of the shape of the shape of a drum, and an endless film, the method which imprints anew the toner image on said middle imprint object secondarily to up to a record medium, and obtains a copy image is learned.

[0003] In addition, in the following explanation, the belt conveyance object of the above, a middle imprint belt, the thing that ****(ed) endless fill in the shape of a drum name generically the member which contacts latent-image support and forms the so-called imprint nip (only henceforth nip), and is also called belt member. Drawing 18 is a mimetic diagram explaining the important section outline structure of the color printer as an example of image formation equipment which used the belt-like middle imprint object as a belt member, and 1 is latent-image support (here). A photo conductor drum, the belt-like middle imprint object whose 2 is a belt member A drive roll, 2b, and 2c (it is hereafter called a middle imprint belt) and 2a A follower roll, A primary transfer roller and 4 a tension roll and 3 2d A secondary transfer roller, The back up roll 5 and 10 which serves as a counterelectrode of the secondary transfer roller 4 while 5 constitutes the circumference conveyance means of the middle imprint belt 2 A middle imprint belt cleaner, The electrification machine in which 11 is uniformly charged with a polar predetermined charge in record media, such as a transfer paper, and 13 photo-conductor drum, and 14 are two or more colors (here). The color developer equipped with each development counter of Black Bk, a cyan C, Magenta M, and Yellow Y, REJIROU for 17 to supply the record medium 11 picked out from the receipt tray of a record medium to predetermined timing to the contact location (secondary imprint section) of the secondary transfer roller 4 and the middle imprint belt 2, It is the electric discharge machine from which 24 removes a photo conductor drum cleaner and 25 removes the surface charge of the photo conductor drum 1.

[0004] In this drawing, the surface of the photo conductor drum 1 is uniformly charged in a polar predetermined charge with the electrification vessel 13, and the electrostatic latent image according to the image of the 1st color (for example, yellow) of the above is formed by the write-in scan of the laser light L modulated with the picture signal of the 1st color. This electrostatic latent image reaches the installation location of a developer 14 in rotation of the photo conductor drum 1, toner development is carried out with the development counter of the

1st color, and a photo conductor drum supports the developed toner image, and rotates further.
 [0005] To compensate for the above-mentioned toner development actuation, the middle imprint belt 2 moves by the peripheral speed and ***** of the photo conductor drum 1. In the primary imprint section which consists of primary transfer rollers 3 arranged in contact with the middle imprint belt 2 directly under the location (nip) where the photo conductor drum 1 and the middle imprint belt 2 contact. With the electrification polarity of the above-mentioned toner impressed to the primary transfer roller 3 concerned, the toner image currently supported by the photo conductor drum 1 by the imprint electric field of reversed polarity is primarily imprinted by the middle imprint belt 2 (primary imprint cycle).

[0006] The toner image primarily imprinted by the middle imprint belt 2 results in the secondary imprint section by which the secondary transfer roller 4 is arranged by circumference migration of the middle imprint belt 2. In the case of a full colour copying machine, the color toner image on top of which the multicolor toner was laid is repeatedly formed on the middle imprint belt 2 by the color (generally yellow:Y, cyan:C, and Magenta:M, black : BK) necessary in from formation of the above-mentioned latent image to the primary imprint of a toner image.

[0007] That is, with color picture formation equipment, generally a developer 14 consists of 4 color development counters of Bk development counter, a cyan development counter, a Magenta development counter, and a yellow development counter, the development counter of each color toner is alternatively located in a development part, or sequential arrangement of the development location is carried out around the photo conductor drum 1 so that the sequential development of the latent image of each color formed in the photo conductor drum 1 can be carried out.

[0008] While removal of a residual toner was made with the latent-image support cleaner 24, after a charge is neutralized by the electric discharge machine 25, as for the photo conductor drum 1 after imprinting the toner image of the 1st color supported by the photo conductor drum 1 on the middle imprint belt 2 in the location of the primary imprint machine 3, formation of the latent image corresponding to the 2nd following color is made. The electrostatic latent image of the 2nd color (for example, Magenta) is developed similarly, and the toner image of the 2nd color is imprinted in piles by the toner image of the 1st color imprinted by the point of the middle imprint belt 2.

[0009] The color toner image which the multiplex imprint was similarly carried out about the 3rd color (cyan) and the 4th color (black) at the middle imprint belt 2, consequently non-established two or more color toner superimposed on the middle imprint belt 2 hereafter is formed (secondary imprint cycle). In addition, the secondary transfer roller 4, the middle imprint object cleaner 10, and an exfoliation pawl are in the location evacuated from the middle imprint belt 2 until the imprint of the last toner image is completed at this time.

[0010] And when the middle imprint belt 2 with which the toner image of all required colors was imprinted primarily arrives at the location of the secondary transfer roller 4, it is taken out from a tray and fed with the record medium 11 which took timing and was sent out by REJIRORU 17 between the middle imprint belt 2 and the secondary transfer roller 4. In case a record medium 11 is pinched with the secondary transfer roller 4, the middle imprint belt 2, and the back up roll 5 and is conveyed, the toner image on the middle imprint belt 2 is secondarily imprinted by the record medium 11 by the imprint electric field formed on the imprint voltage of the electrification polarity and reversed polarity of the above-mentioned toner image impressed between the secondary transfer roller 4 and the middle imprint belt 2.

[0011] The secondary transfer roller 4 consists of a conductive material, and predetermined imprint voltage is impressed from the imprint power supply which is not illustrated. For example, an imprint power supply is connected to the secondary transfer roller 4, the contact roll 6 arranged so that it may rotate in contact with the back up roll 4 is connected to touch-down, and an imprint current path is formed. In addition, it is good also as a configuration which connects an imprint power supply to the contact roll 6, and grounds the secondary transfer roller 4 side.

[0012] The record medium 11 with which the toner image was imprinted secondarily exfoliates from the middle imprint belt 2 by the exfoliation pawl 19, and is sent to a fixing assembly 20.

When making it pass record-medium 11 between the fixing rolls of a pair, it carries out a record medium 11 heating/pressure treatment, and a fixing assembly 20 fixes a toner image, discharges it on the discharge tray 21, and ends an imaging process. When passing the middle imprint object cleaner 10, removal of a residual toner is made, and the next image formation actuation is equipped with the middle imprint belt 2 which the secondary imprint ended.

[0013] With the color picture formation equipment using such a middle imprint belt 2, since the synthetic toner image (superposition image of each color toner image) with which the multiplex imprint was already made is imprinted by the package to the record medium 11, it has the advantage that generating of the location gap between the toner images in the method which carries out the sequential imprint of the toner image of each color, and an image of turbulence can be prevented effectively, in the direct record medium from the latent-image support 1.

[0014] Conventionally, the thing of a publication is known by JP,6-95521,A as this kind of image formation equipment.

[0015]

[Problem(s) to be Solved by the Invention] In the primary imprint section of the above-mentioned imaging process, the toner image (yellow toner image) first imprinted on the middle imprint belt receives imprint electric field, also when carrying out the sequential imprint of each toner image of the toner image (Magenta) of the 2nd color, the toner image (cyan) of the 3rd color, and the toner image (black) of the 4th color, and for every imprint of the toner image of each above-mentioned color, the amount of electrifications increases and it goes.

[0016] Drawing 19 is explanatory drawing of transition of the amount of electrifications of the toner image of the 1st color (yellow) in the primary imprint cycle on a middle imprint belt. As shown in this drawing, for every activation of a primary imprint of the 2nd subsequent color (Magenta), the 3rd color (cyan), and the 4th color (black), the amount of electrifications rises and the toner image of the yellow which is the 1st color primarily imprinted by the middle imprint belt 2 goes.

[0017] moreover, the toner image of the 2nd color (Magenta) — the yellow image of the 1st color on the middle imprint belt 2 — in piles — or after a portion without the yellow image of the 1st color on a middle imprint belt imprints primarily, the amount of electrifications rises and goes for every activation of a primary imprint of the 3rd color (cyan) and the 4th color (black).

Similarly, after the toner image of the 3rd color (cyan) is imprinted primarily, the amount of electrifications rises in response to the imprint electric field at the time of the 4th color (black) primary imprint.

[0018] However, since the toner image of the 4th color (black) of the last color does not have the imprint of other toners, the amount of electrifications at the time of a primary imprint is maintained. Thus, as the color toner image of four colors primarily imprinted on the middle imprint belt 2 was illustrated, max is yellow and the amount of toner electrifications is high in the order of a Magenta, a cyan, and black below.

[0019] Although two or more toner images with which the above-mentioned amounts of electrifications differ will be collectively imprinted to a record medium in a secondary imprint, the optimal imprint voltage to the toner on the middle imprint belt 2 in this secondary imprint changes with amounts of electrifications of a toner. Drawing 20 is explanatory drawing of the amount of toner electrifications on a middle imprint belt, and the relation of optimal secondary imprint voltage, the amount of toner electrifications on a middle imprint belt (micrometer/g) is shown on a horizontal axis, and optimal secondary imprint voltage (kV) is shown on an axis of ordinate.

[0020] As shown in this drawing, the amount of toner electrifications and optimal secondary imprint voltage on a middle imprint belt have the relation of **** direct proportion. That is, it is necessary to make imprint voltage high at the time of the imprint of a toner with the high amount of electrifications, and to make imprint voltage low at the time of the imprint of a toner with the small amount of electrifications. If a secondary imprint is performed on imprint voltage higher than the optimal imprint voltage, imprint current will flow into the toner concerned on the middle imprint belt concerned by the excess of secondary imprint current in a portion with few toners on a middle imprint belt, the electrification polarity of a toner will change, and it will become a

poor imprint.

[0021] On the other hand, if a secondary imprint is performed on imprint voltage lower than the optimal imprint voltage, imprint effectiveness will fall. Thus, with the full color image formation equipment using a middle imprint belt, there was a problem that the optimum conditions of the secondary imprint voltage to two or more toner images could not be set up.

[0022] Moreover, if a transfer roller is just under a photo conductor drum, while an up-and-down vibration occurring in a transfer roller with rotation of a middle imprint belt and a photo conductor drum and being easy to generate imprint unevenness for this vibration Electric field are formed between middle imprint belts and photo conductor drums concerned in the portion (pre nip section) to which a middle imprint belt starts contact to a photo conductor drum, and there is a problem that spilling (Buller) of the toner of photo conductor drum lifting occurs in this electric field.

[0023] What was considered as the configuration which arranges a transfer roller in the periphery lower stream of a river of a photo conductor drum along the conveyance direction of a middle imprint belt as conventional technology for solving the above-mentioned problem in the primary imprint section is indicated by JP,6-95536,A. That is, if a transfer roller is arranged in the periphery lower stream of a river of a photo conductor drum along the conveyance direction of a middle imprint belt in a primary imprint, an exfoliation discharge phenomenon in case a photo conductor drum and a middle imprint belt exfoliate will increase, and the amount of electrifications of the toner on the middle imprint belt after an imprint will increase.

[0024] Drawing 21 is a mimetic diagram explaining the physical relationship of the photo conductor drum in the primary imprint section indicated by the above-mentioned conventional technology, a middle imprint belt, and a primary transfer roller, and, as for a photo conductor drum and 2, 1 is [a middle imprint belt and 3] primary transfer rollers. The primary transfer roller 3 is installed so that ** thickness may be carried out [from the contact section of the photo conductor drum 1 and the middle imprint belt 3] to the portion which shifted only the angle theta on the direction lower stream of a river of a periphery of the photo conductor drum concerned on both sides of the middle imprint belt 2 on the photo conductor drum 1 with the photo conductor drum 1 concerned.

[0025] By arranging a primary transfer roller as mentioned above, an exfoliation discharge phenomenon in case the middle imprint belt 2 separates from the photo conductor drum 1 increases, and the amount of electrifications of the toner on the middle imprint belt 2 increases by this exfoliation discharge. According to this configuration, the amount of electrifications of the black toner of the last color also increases, and even if it sets secondary imprint voltage as 1.6kV, imprint nature with a yellow toner to a good black toner can be obtained.

[0026] However, since a middle imprint belt with tension is sagged with the configuration of drawing 21 , with it, primary imprint nip pressure will become high. It is explanatory drawing of the relation between the nip pressure of a middle imprint belt and a photo conductor drum, and imprint quality, and nip pressure (g/cm) is taken along a horizontal axis, it takes the grade of imprint quality along an axis of ordinate, and drawing 22 is shown.

[0027] If the nip pressure of a middle imprint belt and a photo conductor drum becomes large as the continuous line showed to this drawing, generating of a poor inside omission imprint will also increase. Moreover, if nip pressure is made lower than a certain value, as this drawing dotted line showed, generating of imprint unevenness will increase. Moreover, since the imprint member is installed directly under the nip of a photo conductor drum and a middle imprint belt, vibration occurs in an imprint member with contacting-by-pressing migration of a photo conductor drum and a middle imprint belt, the vibration induces fluctuation of said nip pressure, and imprint unevenness occurs.

[0028] Furthermore, the electric field from an imprint member reach the upstream region (pre nip section) close to the nip section of a photo conductor drum and a middle imprint belt, and this causes [of a toner / of scattering (the so-called Buller)] generating, and brings about image quality deterioration. In addition, although only the method which imprints the toner image formed in latent-image support above to a record medium through a middle imprint belt was explained The color picture formation equipment of the method which puts on the record medium which

carries out installation adsorption of each of the multicolor toner image formed in two or more latent-image support, respectively at a form conveyance belt, and is conveyed to a tandem one by one, and is imprinted, And also in image formation equipments, such as monochrome of the method which the shape of a belt, the film up, etc. contact the imprint belt (belt member) according to this to latent-image support, such as not only a color but a photo conductor drum, and imprints the imprint of a toner image to a direct record medium, it is the same.

[0029] As mentioned above, in a Prior art, since the imprint means is installed directly under [nip] latent-image support and a belt member, vibration occurs in an imprint member with contacting-by-pressing migration of latent-image support and a belt member, this brings about fluctuation of nip pressure and imprint unevenness occurs. Furthermore, the electric field from an imprint member reached the upstream close to the nip section of latent-image support and a belt member, this caused [of Buller] generating, and there was a problem of bringing about image quality deterioration.

[0030] Furthermore, with full color image formation equipment, since the amount of electrifications of the toner of two or more colors was different, there was a problem that a setup of the optimal imprint voltage became difficult. The purpose of this invention is to solve many problems of the above-mentioned conventional technology, cancel a middle imprint object and the poor imprint in the method using the belt member as a record-medium conveyance member or an imprint means, and offer the image formation equipment which can obtain a high-definition transfer picture.

[0031]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the 1st invention according to claim 1 Latent-image support which forms a latent image according to a picture signal, and a developer which develops said latent image with a predetermined toner, A belt member contacted and arranged in a part at said latent-image support and said latent-image support of said belt member are image formation equipment which possesses at least an imprint means to make a toner image which has been arranged in the opposite side and supported by said latent-image support transfer to said belt member side. Said imprint means It is characterized by having arranged on a lower stream of a river close to a surface of action of said latent-image support and said belt member.

[0032] Moreover, 2nd invention according to claim 2 is characterized by installing said imprint means in the 1st invention in a location in contact with said belt member. Furthermore, 3rd invention according to claim 3 is characterized by said imprint means in the 2nd invention being a transfer roller. Furthermore, 4th invention according to claim 4 is characterized by having arranged said belt member in the 3rd invention on a share tangent of said latent-image support and said imprint means.

[0033] While vibration of imprint means, such as a transfer roller, is controlled by this configuration, fluctuation of nip pressure is lost and imprint nonuniformity does not occur, it is lost that electric field from an imprint means which caused Buller generating generate Buller in the pre nip section, and high-definition image formation becomes possible. Furthermore, 5th invention according to claim 5 is characterized by installing said imprint means in the 1st invention in a location which counters by non-contact [said / belt member and non-contact].

[0034] Furthermore, 6th invention according to claim 6 is characterized by said imprint means in the 5th invention being a transfer roller. Furthermore, 7th invention according to claim 7 is characterized by said imprint means in the 5th invention being corotron. By the configuration of the above 5th thru/or the 7th invention, the same effect as said the 2nd thru/or 4th invention is acquired.

[0035] Furthermore, 8th invention according to claim 8 is characterized by making contact pressure of said latent-image support and belt member in the 1st invention into 10 thru/or 20 g/cm. Furthermore, 9th invention according to claim 9 is characterized by setting distance with a center of a point of contact of a center of a point of contact of said latent-image support in the 1st invention, and said belt member, said belt member, and said imprint means, or a center of the point approaching [non-contact opposite] to 2 thru/or 4mm.

[0036] The nip section and an imprint means for controlling Buller's generating by the

configuration of the above 8th and the 9th invention, while preventing generating of imprint nonuniformity are arranged in the optimal location, and a high-definition image can be formed. Furthermore, 10th invention according to claim 10 is characterized by the belt member concerned making said electrostatic latent-image support contact by contacting said imprint means by pressing in said belt member while said electrostatic latent-image support and a field which counters lay said belt member in the 2nd invention with a firm-bridging means in the electrostatic latent-image support concerned and the non-contact condition.

[0037] By this configuration, the optimal nip pressure of latent-image support and a belt member is set up easily, and a high-definition image can be formed. Furthermore, 11th invention according to claim 11 is characterized by setting a gap of said belt member in the 5th invention, and said imprint means to less than 100 micrometers. By this configuration, discharge between said belt members and said imprint means can be controlled, and a high-definition image without image turbulence can be obtained.

[0038] Furthermore, 12th invention according to claim 12 is characterized by installing a baffle plate in the migration direction upstream of said belt member of said corotron in the 7th invention, and the belt member concerned which counters. Electric-field invasion to a contact initiation field of said electrostatic latent-image support and said belt member is intercepted by this configuration, image turbulence by electric-field invasion in the pre-nip section is called off, and a high-definition image can be obtained.

[0039] Furthermore, 13th invention according to claim 13 is characterized by constituting said imprint means in the 11th invention from a metal roll. In this configuration, surface process tolerance of a metal roll can be improved and an installation gap between belt members can be set as a precision because said imprint means considers as a metal roll.

[0040] Furthermore, 14th invention according to claim 14 is characterized by having a high resistance resin layer on the surface of said metal roll in the 13th invention. Image quality deterioration which can avoid discharge between belt members and originates in generating of discharge in the imprint section by this configuration is controlled. Furthermore, the 15th invention according to claim 15 is a volume-resistivity value of said imprint means in the 3rd invention 104 Or 109 It is characterized by considering as omega-cm.

[0041] By this configuration, discharge between belt members can be avoided with applied voltage for forming imprint electric field, and high-definition image formation becomes possible. Furthermore, the 16th invention according to claim 16 A photo conductor drum which forms a latent image according to a picture signal, and a color developer which develops said latent image with a predetermined color toner, A middle imprint belt which carries out the sequential imprint of the toner image of each color by which has been arranged so that a part may be around contacted and gone to said photo conductor drum, and sequential formation was carried out for every color at said photo conductor drum, and is supported as a full color toner image, A secondary transfer roller which carries out the package imprint of the full color toner image supported by said middle imprint belt at a record medium, It arranges on a lower stream of a river close to a surface of action of said photo conductor drum and said middle imprint belt. And by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a toner image support side of said middle imprint belt It is characterized by having at least a primary transfer roller by which contact arrangement was carried out with said middle imprint belt which forms imprint electric field between said latent-image support, and imprints said toner image primarily to said middle imprint belt.

[0042] It sets in this configuration, and a photo conductor drum forms a latent image according to a picture signal of the predetermined color concerned by scan of laser light according to a picture signal of a predetermined color etc., after being uniformly charged in predetermined polarity. A color developer has two or more toner development machines which have a toner of predetermined two or more colors, and develops said latent image with a predetermined toner.

[0043] A middle imprint belt is arranged so that a part may be around contacted and gone to a photo conductor drum which supported a developed toner image, it carries out the sequential imprint of the toner image of each color by which sequential formation was carried out for every color at said photo conductor drum, and supports it as a full color toner image. A secondary

transfer roller carries out the package imprint of the full color toner image supported by said middle imprint belt at a record medium.

[0044] By being arranged on a lower stream of a river close to a surface of action of latent-image support and said middle imprint belt, and impressing the electrification polarity of a toner image, and polar voltage of reverse in contact with a rear face of a toner image support side of a middle imprint belt, a primary transfer roller forms imprint electric field between photo conductor drums, and imprints a toner image primarily to said middle imprint belt. While vibration of a primary transfer roller accompanying contacting-by-pressing migration with a photo conductor drum and a middle imprint belt is controlled, fluctuation of nip pressure is lost by this and imprint nonuniformity does not occur, it is lost that electric field from an imprint means which caused Buller generating generate Buller in the pre nip section, and high-definition image formation becomes possible.

[0045] Furthermore, the 17th invention according to claim 17 A photo conductor drum which forms a latent image according to a picture signal, and a color developer which develops said latent image with a predetermined color toner, A middle imprint belt which carries out the sequential imprint of the toner image of each color by which has been arranged so that a part may be around contacted and gone to said photo conductor drum, and sequential formation was carried out for every color at said photo conductor drum, and is supported as a full color toner image, A secondary transfer roller which carries out the package imprint of the full color toner image supported by said middle imprint belt at a record medium, It arranges on a lower stream of a river close to a surface of action of said photo conductor drum and said middle imprint belt. And by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a toner image support side of said middle imprint belt It is characterized by having at least said middle imprint belt with which imprint electric field are formed between said photo conductor drums, and said toner image is primarily imprinted to said middle imprint belt, and a primary transfer roller arranged non-contact.

[0046] It sets in this configuration, and a photo conductor drum forms a latent image according to a picture signal of the predetermined color concerned by scan of laser light according to a picture signal of a predetermined color etc., after being uniformly charged in predetermined polarity. A color developer has two or more toner development machines which have a toner of predetermined two or more colors, and develops said latent image with a predetermined toner.

[0047] A middle imprint belt is arranged so that a part may be around contacted and gone to a photo conductor drum which supported a developed toner image, it carries out the sequential imprint of the toner image of each color by which sequential formation was carried out for every color at said photo conductor drum, and supports it as a full color toner image. A secondary transfer roller carries out the package imprint of the full color toner image supported by said middle imprint belt at a record medium.

[0048] A primary transfer roller is arranged on a lower stream of a river close to a surface of action of latent-image support and said middle imprint belt, and forms imprint electric field between photo conductor drums by being arranged in a non-contact location at a rear face of a toner image support side of a middle imprint belt, and impressing the electrification polarity of a toner image, and polar voltage of reverse, and imprints a toner image primarily to said middle imprint belt.

[0049] While vibration of a primary transfer roller accompanying contacting-by-pressing migration with a photo conductor drum and a middle imprint belt is controlled, fluctuation of nip pressure is lost by this and imprint nonuniformity does not occur, it is lost that electric field from an imprint means which caused Buller generating generate Buller in the pre nip section, and high-definition image formation becomes possible. Furthermore, the 18th invention according to claim 18 A photo conductor drum which forms a latent image according to a picture signal, and a color developer which develops said latent image with a predetermined color toner, An imprint belt which conveys a record medium which imprints said predetermined color toner image which has been arranged so that a part may be around contacted and gone to said photo conductor drum, and was formed in said photo conductor drum, It arranges on a lower stream of a river close to a surface of action of said photo conductor drum and said imprint belt. And it is

characterized by having at least a transfer roller by which contact arrangement was carried out with said imprint belt which forms imprint electric field between said photo conductor drums by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a record-medium installation side of said imprint belt.

[0050] It sets in this configuration, and a photo conductor drum forms a latent image according to a picture signal of the predetermined color concerned by scan of laser light according to a picture signal of a predetermined color etc., after being uniformly charged in predetermined polarity. A color developer has two or more toner development machines which have a toner of predetermined two or more colors, and develops said latent image with a predetermined toner.

[0051] An imprint belt is arranged so that a part may be around contacted and gone to a photo conductor drum, and it conveys a record medium which imprints said predetermined toner image formed in said photo conductor drum. A transfer roller forms imprint electric field between said photo conductor drums by arranging on a lower stream of a river close to a surface of action of a photo conductor drum and said imprint belt, and impressing the electrification polarity of said toner image, and polar voltage of reverse in contact with a rear face of a record-medium installation side of an imprint belt.

[0052] While vibration of a transfer roller accompanying contacting-by-pressing migration with a photo conductor drum and an imprint belt is controlled, fluctuation of nip pressure is lost by this and imprint nonuniformity does not occur, it is lost that electric field from an imprint means which caused Buller generating generate Buller in the pre nip section, and high-definition image formation becomes possible. Furthermore, the 19th invention according to claim 19 A photo conductor drum which forms a latent image according to a picture signal, and a color developer which develops said latent image with a predetermined color toner, An imprint belt which conveys a record medium which imprints said predetermined color toner image which has been arranged so that a part may be around contacted and gone to said photo conductor drum, and was formed in said photo conductor drum, It arranges on a lower stream of a river close to a surface of action of said photo conductor drum and said imprint belt. And it is characterized by having at least said imprint belt with which imprint electric field are formed between said photo conductor drums, and a transfer roller arranged non-contact by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a record-medium installation side of said imprint belt.

[0053] It sets in this configuration, and a photo conductor drum forms a latent image according to a picture signal of the predetermined color concerned by scan of laser light according to a picture signal of a predetermined color etc., after being uniformly charged in predetermined polarity. A color developer has two or more toner development machines which have a toner of predetermined two or more colors, and develops said latent image with a predetermined toner.

[0054] An imprint belt is arranged so that a part may be around contacted and gone to a photo conductor drum, and it conveys a record medium which imprints said predetermined toner image formed in said photo conductor drum. A transfer roller is arranged on a lower stream of a river close to a surface of action of a photo conductor drum and said imprint belt, and is arranged by non-contact at the rear face of a record-medium installation side of an imprint belt, and forms imprint electric field between said photo conductor drums by impressing the electrification polarity of said toner image, and polar voltage of reverse.

[0055] While vibration of a transfer roller accompanying contacting-by-pressing migration with a photo conductor drum and an imprint belt is controlled, fluctuation of nip pressure is lost by this and imprint nonuniformity does not occur, it is lost that electric field from an imprint means which caused Buller generating generate Buller in the pre nip section, and high-definition image formation becomes possible. Furthermore, the 20th invention according to claim 20 Two or more photo conductor drums which form a latent image according to one each of the picture signals of two or more colors, respectively, Two or more color developers which are formed in each of two or more of said photo conductor drums, and develop each latent image with a predetermined color toner, An imprint belt conveyed so that each color toner image which has been arranged so that it may contact and a part may be around gone to each of said photo conductor drum, and was formed in each of said photo conductor drum may be imprinted in piles one by one, It

arranges on a lower stream of a river close to each surface of action of said each photo conductor drum and said imprint belt. And it is characterized by having at least two or more transfer rollers by which contact arrangement was carried out with said imprint belt which forms imprint electric field between said each photo conductor drum, respectively by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a record-medium installation side of said imprint belt.

[0056] In this configuration, two or more photo conductor drums form a latent image according to one each of the picture signals of two or more colors. Two or more color developers are formed in each of two or more of said photo conductor drums, and develop each latent image with a predetermined color toner. An imprint belt is conveyed so that each color toner image which has been arranged so that it may contact and a part may be around gone to each of a photo conductor drum, and was formed in each of said photo conductor drum may be imprinted in piles one by one.

[0057] Two or more transfer rollers form imprint electric field between said each photo conductor drum, respectively by arranging on a lower stream of a river close to each surface of action of said each photo conductor drum and said imprint belt, and impressing the electrification polarity of said toner image, and polar voltage of reverse in contact with a rear face of a record-medium installation side of said imprint belt. While vibration of each transfer roller in accordance with contacting-by-pressing migration with each photo conductor drum and an imprint belt is controlled by this, fluctuation of nip pressure is lost and imprint nonuniformity does not occur, it is lost that electric field from an imprint means which caused Buller generating generate Buller in each pre nip section, and high-definition image formation becomes possible.

[0058] Furthermore, the 21st invention according to claim 21 Two or more photo conductor drums which form a latent image according to one each of the picture signals of two or more colors, respectively, Two or more color developers which are formed in each of two or more of said photo conductor drums, and develop each latent image with a predetermined color toner, An imprint belt conveyed so that each color toner image which has been arranged so that it may contact and a part may be around gone to each of said photo conductor drum, and was formed in each of said photo conductor drum may be imprinted in piles one by one, It arranges on a lower stream of a river close to each surface of action of said each photo conductor drum and said imprint belt. And it is characterized by having at least said imprint belt with which imprint electric field are formed between said each photo conductor drum, respectively, and two or more transfer rollers arranged non-contact by impressing the electrification polarity of said toner image, and polar voltage of reverse to a rear face of a record-medium installation side of said imprint belt.

[0059] In this configuration, two or more photo conductor drums form a latent image according to one each of the picture signals of two or more colors. Two or more color developers are formed in each of two or more of said photo conductor drums, and develop each latent image with a predetermined color toner. An imprint belt is conveyed so that each color toner image which has been arranged so that it may contact and a part may be around gone to each of a photo conductor drum, and was formed in each of said photo conductor drum may be imprinted in piles one by one.

[0060] Two or more transfer rollers are arranged on a lower stream of a river close to each surface of action of said each photo conductor drum and said imprint belt, and are arranged by non-contact at the rear face of a record-medium installation side of said imprint belt, and form imprint electric field between said each photo conductor drum by impressing the electrification polarity of said toner image, and polar voltage of reverse, respectively. While vibration of each transfer roller in accordance with contacting-by-pressing migration with each photo conductor drum and an imprint belt is controlled by this, fluctuation of nip pressure is lost and imprint nonuniformity does not occur, it is lost that electric field from an imprint means which caused Buller generating generate Buller in each pre nip section, and high-definition image formation becomes possible.

[0061] In addition, although a photo conductor drum which is the latent-image support in the above 16th thru/or the 21st invention is the drum-like member which generally covered a photo

conductor nature material which forms an electrostatic latent image with a scan of light, such as laser light, a thing of format which forms a latent image with not only the above but the magnetic head or an ion arm head as latent-image support is sufficient as it. Moreover, although a belt member which can be set they to be [any of the above-mentioned invention] is also an endless belt-like member over which it generally built among two or more rolls, what was considered as a configuration which does not restrict to this and was supported in the shape of a drum may be used.

[0062] Furthermore In color picture formation equipment of format which piles up a toner image of two or more colors which two or more latent-image support (photo conductor drum) was made to support, respectively one by one, and imprints it according to conveyance of the imprint belt concerned on record media, such as a transfer paper which lays on an imprint belt in said the 20th thru/or 21st invention, and is conveyed Although considered as a configuration which arranges an imprint means to constitute the imprint section of all photo conductor drums, on a nip section lower stream of a river what restricts this invention to this — it is not — the 1, 2, or 3 — or it is good also as a configuration which arranges only an imprint member (a transfer roller or corotron) which imprint electric field arrange in the nip section of the high last imprint part on the nip section lower stream of a river concerned.

[0063] By having arranged a transfer roller which imprints a toner image supported by latent-image support to the downstream of a contact part (nip) with imprint objects, such as the latent-image support concerned, a middle imprint object belt, or an imprint belt, according to this invention Exfoliation discharge in a field which leaves the above-mentioned imprint object and latent-image support becomes large, the amount of electrifications of the last imprint toner with few amounts of electrifications increases in two or more imprinted toner images, and the poor imprint at the time of a secondary imprint to a record medium or a direct imprint to a record medium is prevented.

[0064] And since a surface of action of latent-image support, a middle imprint object, or an imprint belt is still short, both nip pressure does not become large, therefore does not produce the poor imprint of the so-called inside omission.

[0065]

[Embodiment of the Invention] Hereafter, with reference to an example, it explains to details about the gestalt of operation of this invention. Drawing 1 is a mimetic diagram explaining the important section outline structure of the color printer as the first example of the color picture formation equipment by this invention which used the belt-like middle imprint object, the same sign as said drawing 18 corresponds to the same portion, and, for a primary imprint power supply and 8, as for a tray and 16, a secondary imprint power supply and 15 are [6 / a contact roll and 7 / the pick up roll and 17] REJIROU.

[0066] In this drawing, the surface of the photo conductor drum 1 is uniformly charged in a polar predetermined charge with the electrification vessel 13, and the electrostatic latent image according to the image of the 1st color (for example, yellow) of the above is formed by the write-in scan of the laser light L modulated with the picture signal of the 1st color. This electrostatic latent image reaches the installation location of a developer 14 in rotation of the photo conductor drum 1, toner development is carried out with the development counter of the 1st color, and a photo conductor drum supports the toner image by which the lower image was carried out, and rotates further.

[0067] To compensate for the above-mentioned toner development actuation, the middle imprint belt 2 moves by the peripheral speed and ***** of the photo conductor drum 1, and the toner image with which the electrification polarity of the above-mentioned toner impressed to the primary transfer roller 3 from the primary imprint power supply 7 in the primary imprint section which the photo conductor drum 1 and the middle imprint belt 2 contact was supported by the photo conductor drum 1 by the imprint electric field of reversed polarity is primarily imprinted by the middle imprint belt 2 (primary imprint cycle).

[0068] The primary transfer roller 3 is installed in the portion which estranges only d (2 thru/or 4mm) to the downstream of the middle imprint object belt 2 concerned from the center of a contact portion (nip section) of the photo conductor drum 1 and the middle imprint object belt 2,

and touches only the middle imprint object belt 2 concerned. It is set as 10 thru/or 20 g/cm, the pressure, i.e., the nip pressure, of the above-mentioned nip section. The toner image primarily imprinted by the middle imprint belt 2 results in the secondary imprint section by which the secondary transfer roller 4 is arranged by circumference migration of the middle imprint belt 2.

[0069] In the case of a full colour copying machine, the color toner image on top of which the multicolor toner was laid is repeatedly formed on the middle imprint belt 2 by the color (generally yellow:Y, cyan:C, and Magenta:M, black : BK) necessary in from formation of the above-mentioned latent image to the primary imprint of a toner image. That is, with color picture formation equipment, generally a developer 14 consists of 4 color development counters of a cyan development counter, a Magenta development counter, a yellow development counter, and Bk development counter, the development counter of each color toner is alternatively located in a development part, or sequential arrangement of the development location is carried out around the photo conductor drum 1 so that the sequential development of the latent image of each color formed in the photo conductor drum 1 can be carried out.

[0070] While removal of a residual toner was made with the latent-image support cleaner 24, after a charge is neutralized by the electric discharge machine 25, as for the photo conductor drum 1 after imprinting the toner image of the 1st color supported by the photo conductor drum 1 on the middle imprint belt 2 in the location of the primary imprint machine 3, formation of the latent image corresponding to the 2nd following color is made. The electrostatic latent image of the 2nd color (for example, Magenta) is developed similarly, and the toner image of the 2nd color is imprinted in piles by the toner image of the 1st color imprinted by the point of the middle imprint belt 2.

[0071] The color toner image which the multiplex imprint was similarly carried out about the 3rd color (cyan) and the 4th color (black) at the middle imprint belt 2, consequently non-established two or more color toner superimposed on the middle imprint belt 2 hereafter is formed (secondary imprint cycle). In addition, the secondary transfer roller 4, the middle imprint object cleaner 10, and an exfoliation pawl are in the location evacuated from the middle imprint belt 2 until the imprint of the last toner image is completed at this time.

[0072] And when the middle imprint belt 2 with which the toner image of all required colors was imprinted primarily arrives at the location of the secondary transfer roller 4, it is taken out from a tray 15 and fed with the record medium 11 which took timing and was sent out by REJIROU 17 between the middle imprint belt 2 and the secondary transfer roller 4. In case a record medium 11 is pinched with the secondary transfer roller 4, the middle imprint belt 2, and the back up roll 5 and is conveyed, the toner image on the middle imprint belt 2 bundles up to a record medium 11 by the imprint electric field formed between the secondary transfer roller 4 and the middle imprint belt 2 on the imprint voltage of the electrification polarity and reversed polarity of the above-mentioned toner image impressed from the secondary imprint power supply 8, and it imprints secondarily.

[0073] The record medium 11 with which the toner image was imprinted secondarily exfoliates from the middle imprint belt 2 by the exfoliation pawl 19, and is sent to a fixing assembly 20 with the record-medium conveyance belt 18. When making it pass record-medium 11 between the fixing rolls of a pair, a fixing assembly 20 discharges a record medium 11 on heating / discharge tray which carries out pressure treatment, and does not fix and illustrate a toner image, and ends an imaging process.

[0074] When passing the middle imprint object cleaner 10, removal of a residual toner is made, and the next image formation actuation is equipped with the middle imprint belt 2 which the secondary imprint ended. Drawing 2 is an important section mimetic diagram explaining the details configuration of the primary imprint portion of the color picture formation equipment by this invention which used the belt-like middle imprint object, and the same sign as drawing 1 corresponds to the same portion.

[0075] In this drawing, the toner image T charged in minus polarity with the developer 14 is formed in the surface of the photo conductor drum 1. For the middle imprint object belt 2, it consists of polyimide system resin, and the thickness is 60-90 micrometers, and a volume resistivity is 10⁹-10¹². Omega-cm and surface resistivity are the resin films of half-conductivity

adjusted to 1011-1013ohms / **.

[0076] This middle imprint object belt 2 is usable if thickness, a volume resistivity, and surface resistivity are the semiconductor nature resin materials which are in the range of the above-mentioned value, in addition the thing which made acrylic resin, vinyl chloride system resin, polyester system resin, or polycarbonate system resin contain a resistance stabilizing material can also be used for it. Now, in other words, the middle imprint object belt 2 in the primary imprint section is arranged on the tangent of the surface of the photo conductor drum 1. That is, most contact force to the photo conductor drum 1 by **** of the middle imprint object belt 2 is set to 0. Contact pressure will become very high if the lap of the middle imprint object belt 2 is carried out to the photo conductor drum 1.

[0077] The contact pressure of the photo conductor drum 1 and the middle imprint object belt 2 in the primary imprint section is obtained by pushing up above the drawing with the spring which does not illustrate the primary transfer roller 3. If 10 - 20 g/cm is suitable for this pressure and its contact pressure is higher than this, a poor inside omission imprint will generate it. Moreover, if contact pressure is low, imprint unevenness will arise.

[0078] Therefore, the contact width of face (nip width of face) of the middle imprint object belt 2 and the photo conductor drum 1 is set to about 0.5-2mm. The primary transfer roller 3 is arranged on the direction lower stream of a river of 2-4mm process from the center of contact width of face of the photo conductor drum 1 and the middle imprint object belt 2. Imprint current is transmitted from the primary transfer roller 3 to the middle imprint object belt 2 of half-conductivity, and an imprint operation is performed by flowing into the surface of action of the photo conductor drum 1 and the middle imprint object belt 2.

[0079] Although positive voltage is impressed to the primary transfer roller 3 in order to imprint the minus electrification toner image of the upstream of the photo conductor drum 1, it is more desirable for control of imprint electric field to adopt constant current control, since there are dispersion in resistance of the primary transfer roller 3, dispersion of resistance of the middle imprint object belt 2, dispersion of electrification of a toner, etc. In this example, imprint nature with imprint current good at 15-25microA was obtained.

[0080] The volume resistivity of the primary transfer roller 3 is 104-109. Omega-cm is suitable, the material is foaming elastic sponge-like silicone rubber, and the degree of hardness used the 25 degrees - 45 degrees (Aska C measurement) thing. in addition, the material of the primary transfer roller 3 — in addition, materials, such as EPDM and polyurethane, can also be used if each above-mentioned value is satisfied.

[0081] In this example, the path of 20mm and the photo conductor drum 1 of the path of the primary transfer roller 3 is 84mm. With the above-mentioned configuration, if a primary imprint is performed, primary imprint voltage impressed to the secondary transfer roller 3 in a secondary imprint will be set to plus 1.6kV, and a good image will be obtained. This is because the amount of electrifications of black which is the last color is stable from the yellow whose toner image on the middle imprint belt 2 is the 1st color.

[0082] The imprint electric-field field in the portion into which a middle imprint belt exfoliates from the photo conductor drum in the primary imprint section is from a primary transfer roller to the contact section of a photo conductor drum and a middle imprint belt, in the above-mentioned exfoliation section, exfoliation electric field become strong, and stabilization of the above-mentioned amount of electrifications is because the amount of electrifications of the toner image on a middle imprint belt increases by the exfoliation discharge. Moreover, if the distance of the primary transfer roller 3 and the middle imprint object belt 2 is less than 100 micrometers, even when both are made non-contact, good imprint nature will be obtained.

[0083] The mimetic diagram explaining the important section outline structure of the color printer as the second example of the color picture formation equipment by this invention for which drawing 3 used the belt-like middle imprint object, and drawing 4 are the important section mimetic diagrams explaining the details configuration of the primary imprint portion of the second example, and the same sign as drawing 1 corresponds to the same portion. This example is the same configuration as said drawing 1 except for the configuration which has arranged the primary transfer roller 3 by non-contact at the rear face of the middle imprint belt 2.

[0084] In this example, the primary transfer roller 3 is arranged by non-contact from the center of the nip section on 2 thru/or 4mm lower stream of a river, and it is installed in a non-contact location so that distance with the middle imprint object belt 2 may be set to less than 100 micrometers. The primary transfer roller 3 at this time is constant current control, and should just set a current value to 15-25microA.

[0085] High-definition image formation becomes possible like [this example] the 1st example of the above. The mimetic diagram explaining the important section outline structure of the color printer as the third example of the color picture formation equipment by this invention for which drawing 5 used the belt-like middle imprint object, and drawing 6 are the important section mimetic diagrams explaining the details configuration of the primary imprint portion of the third example, and the same sign as drawing 3 corresponds to the same portion.

[0086] This example is the same configuration as said drawing 3 except for the configuration which has arranged corotron 3' by non-contact at the rear face of the middle imprint belt 2 as a primary imprint means. In this example, corotron 3' is arranged by non-contact from the center of the nip section on 2 thru/or 4mm lower stream of a river. High-definition image formation becomes possible like [this example] the 1st example of the above.

[0087] Drawing 7 is a mimetic diagram explaining the whole color picture formation equipment configuration by this invention, and has the configuration of said drawing 1 using a belt-like middle imprint object. In addition, the whole image formation equipment configuration corresponding to said third example and the fourth example is the same except for the portion of a primary imprint means. For 40, as for the picture signal processing section and 60, in this drawing, the laser write-in section and 50 are [the imaging section and 70] imaging control sections.

[0088] The laser write-in section 40 consists of laser 41, the image formation optical system 42, scan optical system 43, and a mirror 44, and laser 41 carries out outgoing radiation of the laser light L modulated with the picture signal of each color which performed signal processing, such as various kinds of amendments in the picture signal processing section 50. The imaging section 60 has the photo conductor drum 1, the middle imprint belt 2, the primary transfer roller 3, and the secondary transfer roller 4, and the latent-image support electrification machine (corotron) 13, the color developer, the latent-image support cleaner 24, and the electric discharge machine 25 are installed around the photo conductor drum. Moreover, the middle imprint belt 2 goes around to drive roll 2a, follower roll 2b, and tension roll 2d and the back up roll 5, and carries out conveyance migration.

[0089] The imprint current path which is arranged so that the contact roll 6 may carry out contact rotation at the back up roll 5, and results in the layered product → back-up-roll 5 → contact roll 6 → touch-down of a **** cage, the imprint power supply 8 → secondary transfer roller 4 → record medium 11, and the middle imprint belt 2 is constituted. After the last toner image of the toner image of each color with which a photo conductor 1 constitutes a color picture is primarily imprinted on the middle imprint belt 2, the middle imprint belt 2 is conveyed to the secondary imprint part to which the secondary transfer roller 4 is arranged.

[0090] On the other hand, a record medium 11 is taken out from a tray 15 by the pick up roll 16 addressing picking to one sheet, it stands by by REJIROU 17, and a record medium 11 also advances into coincidence at the above-mentioned nip section to the timing to which the multicolor toner image supported by the above-mentioned middle imprint belt 2 advances into the nip section of the secondary transfer roller 4 and the middle imprint belt 2. In the secondary imprint section, imprint current flows to the above-mentioned imprint current path with the secondary imprint voltage impressed from the imprint power supply 8, and the multicolor toner image supported by the middle imprint belt 2 is collectively imprinted to a record medium 11.

[0091] The record medium 11 with which the multicolor toner image was imprinted exfoliates from the middle imprint belt 2 by the exfoliation pawl 19, and after being carried in to a fixing assembly 20 with the storage conveyance belt 18 and carrying out fixing processing, it is discharged by the discharge tray 21. Moreover, with the middle imprint object cleaner 10, removal of a residual toner is performed and the following imprint process is equipped with the middle imprint belt 2 which imprinted the toner image to the record medium 11.

[0092] Thus, the multicolor toner image which carried out the multiplex imprint can be imprinted good on a middle imprint belt at a record medium, and the color picture of high quality can be obtained. Since the surface of action of a photo conductor drum and a middle imprint belt is still short, both nip pressure does not become large, therefore does not produce the poor imprint of the so-called inside omission. Moreover, vibration of a transfer roller is controlled like said example, and generating of Buller in the pre nip section is prevented, and high-definition image formation is made.

[0093] Drawing 8 is a mimetic diagram explaining the important section configuration of the fourth example of this invention which applied this invention to the image formation equipment of the method which imprints directly the toner image formed in the photo conductor drum to a record medium, and, as for a photo conductor drum and 2', 1 is [an imprint belt and 3] transfer rollers. Around the photo conductor drum 1, the developer 14 which develops the latent image formed in the latent-image support electrification machine (corotron) 13 for electrifying the surface of the photo conductor drum concerned with a uniform charge and the photo conductor drum 1, the latent-image support cleaner 24, and the electric discharge machine 25 grade are arranged.

[0094] an imprint — a belt — two — ' — said — the — one — an example — being the same — a material — constituting — having — a drive roll — two — a — ' — a follower — a roll — 2b — ' — a tension roll — two — c — ' — building — having — an arrow head — a direction — conveying — having . moreover, 11 is a record medium, and the record medium 11 picked out from the tray which is not a drawing example stands by by REJIORU 17, and is carried in to this nip to the timing which the toner image formed in the photo conductor drum 1 rotates in the imprint section (the contact section of the photo-conductor drum 1 and imprint belt 2': nip section) in which the transfer roller 3 was installed.

[0095] From the nip portion of the photo conductor drum 1 and imprint belt 2', a transfer roller 3 contacts the rear face of imprint belt 2', and is arranged at it in the location which estranged only distance d on the conveyance direction lower stream of a river of the imprint belt 2' concerned. This transfer roller 3 has estranged imprint belt 2' and the photo conductor drum 1 concerned in the location in contact with imprint belt 2'.

[0096] alienation with the above-mentioned nip and transfer roller 3' — Pole d arranges [center / of nip width of face] about 0.5–2mm and transfer roller 3' like said example on the direction lower stream of a river of 2–4mm process from the center of contact width of face of the photo conductor drum 1 and the middle imprint object belt 2. The photo conductor drum 1 and the size of transfer roller 3' are the same as that of what was explained in said example. The record medium 11 with which the toner image was imprinted is passed to a fixing assembly 20, and fixing processing is carried out by pressurization, or heating/pressurization.

[0097] In this example, although the multiplex imprint of the two or more toner image is not carried out by monochromatic (black: Bk) image formation, a high-definition transfer picture can be obtained by considering as this configuration, without enlarging contact pressure of imprint belt 2' and a transfer roller 3. Moreover, since the surface of action of latent-image support, a middle imprint object, or an imprint belt is still short, both nip pressure does not become large, therefore does not produce the poor imprint of the so-called inside omission.

[0098] Moreover, vibration of a transfer roller is controlled like said example, and generating of Buller in the pre nip section is prevented, and high-definition image formation is made. Drawing 9 is a mimetic diagram explaining the important section configuration of the fifth example of this invention which applied this invention to the image formation equipment of the method which imprints directly the toner image formed in the photo conductor drum to a record medium, it is the same as that of said 4th example except for the point that the transfer roller 3 has been arranged by imprint belt 2' and non-contact, and the same sign as drawing 8 corresponds to the same portion.

[0099] Vibration of a transfer roller is controlled by this example as well as said example, and generating of Buller in the pre nip section is prevented, and high-definition image formation is made. Drawing 10 is a mimetic diagram explaining the important section configuration of the sixth example of this invention which applied this invention to the image formation equipment of the

method which imprints directly the toner image formed in the photo conductor drum to a record medium, it is the same as that of said 5th example except for the point using corotron 3' as an imprint means, and the same sign as drawing 8 corresponds to the same portion.

[0100] In this example, toner development of the electrostatic latent image formed in the photo conductor drum 1 is carried out with a developer 14, and corotron 3' is used as an imprint means for imprinting this on the record medium 11 which lays in imprint belt 2' and is conveyed.

Corotron 3' is installed in a distance d ($= 2-4\text{mm}$) lower stream of a river by the nip section from a center. Imprint belt 2' is non-contact, vibration of a transfer roller is controlled by this example as well as said example, and generating of Buller in the pre nip section is prevented, and, as for corotron 3', high-definition image formation is made.

[0101] Drawing 11 is a mimetic diagram explaining the whole seventh example configuration of this invention which applied this invention to the color picture formation equipment of the method which carries out the direct pile imprint of the multicolor toner image formed in two or more photo conductor drums at a record medium. 11 The photo conductor drum of the 1st color (for example, yellow), and 12 The photo conductor drum of the 2nd color (Magenta), 13 The photo conductor drum of the 3rd color (cyan), and 14 The photo conductor drum of the 4th color (black), 2' is an imprint belt and 31-34. The transfer roller of the 1st - the 4th color and 10 Imprint belt cleaner, 11 is a record medium and 131-134. A latent image support electrification machine, and 141-144 The development counter of the 1st - the 4th color, In 15, a tray and 16 REJIROU and 19' for the pick up roll and 17 Exfoliation corotron, For a fixing assembly and 21, a discharge tray and 22 are [20] an adsorption roll and 241-244. Latent image support cleaner, 251-254 Electric discharge corotron and 411-414 Laser and 421-424 Image formation optical system and 431-434 Scan optical system and 441-444 It is a mirror.

[0102] This example is color picture formation equipment of the so-called tandem die which arranges the imprint section which has the configuration shown in said drawing 4 to a single tier along with one imprint belt 2', and each imprint section takes charge of one color, respectively, and imprints two or more toner images in piles to the record medium of one sheet. It sets to this drawing and is the latent-image support electrification machine 131. Laser 411 charged uniformly Photo conductor drum 11 of the 1st color A latent image is written in with the laser light modulated with the picture signal of the 1st color (yellow).

[0103] The written-in latent image is a development counter 141. Negatives are developed using a yellow toner and it develops as a toner image. Photo conductor drum 11 of this 1st color Formation of a toner image is followed and it is the photo conductor drum 12 of the 2nd color. The toner image of the 2nd color (Magenta) is formed and sequential formation of the toner image of the 3rd color (cyan) and the 4th color (black) is continuously carried out to the photo conductor drum 13 of the 3rd color, and the photo conductor 1 of the 4th color, respectively.

[0104] On the other hand, a record medium 11 is picked out from a tray 15 by the pick up roll 16, and is standing by by REJIROU 17. Photo conductor drum 11 It rotates, and it is opened wide and carried in from above-mentioned REJIROU 17 so that it may be made to synchronize with the timing to which the tip of the toner image formed in the surface advances into the nip section with imprint belt 2' and a record medium 11 may advance into the above-mentioned nip.

[0105] Each transfer roller 31-34 Only distance d is arranged down-stream from the center of the nip section concerned at the rear face of imprint belt 2'. First, transfer roller 31 The record medium 11 with which the toner image of the 1st color was imprinted results in the nip of the photo conductor drum 12 of the 2nd color, and imprint belt 2' in conveyance migration of imprint belt 2'. this time -- a record medium 11 -- the tip of the toner image of the 1st color of imprint ***** -- ** -- photo conductor drum 12 of the 2nd color of the above the tip of the formed toner image is in agreement -- as -- the bearer rate and the photo conductor drum 12 of imprint belt 2' Peripheral speed is controlled.

[0106] Hereafter, it is the photo conductor drum 13 of the 3rd color similarly. The toner image of the 3rd formed color (Magenta), and photo conductor drum 14 of the 4th color The toner image of the 4th formed color (black) is a transfer roller 32-34. The toner image imprinted previously imprints in piles, respectively, the record medium 11 which the imprint of all toner images ended exfoliates from imprint belt 2' by exfoliation corotron 19', and is passed to a fixing assembly 20 -

— having — pressurization — or it is carried out heating/pressure treatment, and immobilization of a toner is performed.

[0107] The record medium 11 to which it was fixed is discharged by the discharge tray 21. It sets in the above-mentioned configuration and is each photo conductor drum 11–14. Transfer roller 31–34 arranged to the imprint part formed by the nip of imprint belt 2'. Like what was explained by said drawing 9 Each photo conductor drum 11–14 From the nip portion with imprint belt 2', it is contacted and arranged at the rear face of imprint belt 2' in the location which estranged only distance d on the conveyance direction lower stream of a river of the imprint belt 2' concerned.

[0108] This transfer roller 31–34 In the location in contact with imprint belt 2', it is imprint belt 2' and the photo conductor drum 11–14 concerned. It is separated. Nip width of face is about 0.5–2mm like said example, and they are each above-mentioned center of the nip section, and a transfer roller 31–34. Clearance d is arranged on the direction lower stream of a river of 2–4mm process. Photo conductor drum 11–14 Transfer roller 31–34 A material and size are the same as that of what was explained in said example.

[0109] A high-definition transfer picture can be obtained also by this example, without enlarging contact pressure of an imprint belt and a transfer roller. Moreover, vibration of a transfer roller is controlled, and generating of Buller in the pre nip section is prevented, and high-definition image formation is made. Drawing 12 is a mimetic diagram explaining the whole eighth example configuration of this invention which applied this invention to the color picture formation equipment of the method which carries out the direct pile imprint of the multicolor toner image formed in two or more photo conductor drums at a record medium, and is a transfer roller 31–34. Except for the point arranged by non-contact to the rear face of imprint belt 2', it is the same configuration as said 7th example.

[0110] A high-definition transfer picture can be obtained also according to this example, without enlarging contact pressure of an imprint belt and a transfer roller. Moreover, vibration of a transfer roller is controlled, and generating of Buller in the pre nip section is prevented, and high-definition image formation is made. Drawing 13 is a mimetic diagram explaining the whole ninth example configuration of this invention which applied this invention to the color picture formation equipment of the method which carries out the direct pile imprint of the multicolor toner image formed in two or more photo conductor drums at a record medium, it is the same as that of said 8th example except for the point using corotron as an imprint means, and, in 3', the same sign as corotron and drawing 12 corresponds to the same portion.

[0111] At this example, it is the photo conductor drum 12–14. They are developers 141–144 about the formed electrostatic latent image. Toner development is carried out with each color toner, and corotron 3' is used as an imprint means for imprinting this on the record medium 11 which lays in imprint belt 2' and is conveyed. Corotron 3' is installed in a distance d ($= 2-4\text{mm}$) lower stream of a river by the nip section from a center. Imprint belt 2' of corotron 3' is non-contact.

[0112] A high-definition transfer picture can be obtained also according to this example, without enlarging contact pressure of an imprint belt and a transfer roller. Moreover, fluctuation does not arise in the imprint electric field in corotron 3' like said example, and generating of Buller in the pre nip section is prevented, and high-definition image formation is made. In each example explained above, in the case of the transfer roller which installed the imprint means in the lower stream of a river of the nip section, and was contacted to the belt member, current flows through a belt member at the nip section from a transfer roller, and the toner image of latent-image support is imprinted by the record medium by the electric field formed in the nip section concerned.

[0113] Moreover, in a belt member, since imprint electric field are built between the imprint nip section and a transfer roller, the toner on the belt member immediately after an imprint receives exfoliation discharge, and the charge of electrification increases it. In addition, it is also the same as when a transfer roller is installed by non-contact to a belt member. If a photo conductor drum and a transfer roller are made to eat into a belt member, propagation and the drive stability of a belt member will get worse remarkably at a belt member, and vibration of a photo conductor

drum and vibration of a transfer roller will cause [so-called] banding.

[0114] Therefore, in this invention, a belt member and a transfer roller are arranged on a **** tangent to a photo conductor drum, and generating of the above-mentioned problem is prevented. Drawing 14 is explanatory drawing of the pressure of the imprint nip section, and the relation of the imprint unevenness at the time of a patch pattern (patchy pattern: mottle) imprint, a horizontal axis shows the pressure (nip pressure) (g/cm) of the nip section, and an axis of ordinate shows the grade of imprint unevenness (imprint unevenness).

[0115] Moreover, drawing 15 is explanatory drawing of the pressure of the imprint nip section, and the relation of inside omission imprint unevenness, a horizontal axis shows the pressure (nip pressure) (g/cm) of the nip section, and an axis of ordinate shows the grade of the imprint unevenness (extract during an imprint) of a patch pattern. It is shown that an image is obtained for the fitness no imprint unevenness is [fitness / nip pressure] in drawing 14 at 10 or more g/cm, and it is shown by drawing 15 that an image is obtained for the fitness in which nip pressure does not have an omission during an imprint at 20 or less g/cm. Therefore, as for nip pressure, it is desirable to consider as 20 or less g/cm by 10 or more g/cm.

[0116] If the nip pressure of a photo conductor drum and a belt member is maintained at 10 thru/or 20 g/cm, the nip width of face of a photo conductor drum and a belt member will be set to 0.5 thru/or 2mm. The tensions of the belt member at this time are 3 thru/or 4 kg-f. Even if it thinks from the field of imprint nature, it is appropriate for the nip width of face of a photo conductor drum and an imprint belt to consider as 0.5 thru/or the range of 2mm. In order to perform the stable imprint, a certain amount of nip width of face is required, there should just be 0.5mm or more, but if nip width of face is too wide, image turbulence will occur at the time of an imprint. If it is difficult this to make a photo conductor drum and a belt member into uniform velocity completely, and it has touched broadly while the belt member and the photo conductor drum had had the speed difference, in the contact area (nip width of face), image turbulence will produce it.

[0117] In the example corresponding to invention of the 10th of said this invention, it considers as the configuration which contacts a belt member to a photo conductor drum by changing the belt member into the non-contact condition beforehand to the photo conductor drum, and raising a belt member with a transfer roller. Drawing 16 is explanatory drawing of the basis of the example corresponding to the 10th invention, (a) is a block diagram and (b) is explanatory drawing of the amount of interlocking (mm) to the photo conductor drum of a belt member (imprint belt), and the relation of nip width of face (mm).

[0118] said — drawing — (— a —) — having been shown — as — a belt — a member — two — the time — a roll — two — a — 2b — building — having had — a condition — **** — a location non-contact in the photo conductor drum 1 — it is . Then, when attaching a transfer roller 3, the belt member 2 is raised in the direction of a photo conductor drum with the transfer roller 3 concerned, and the belt member concerned is contacted to the photo conductor drum 1.

[0119] Although the optimal ranges of the nip width of face of a photo conductor drum and a belt member are 0.5 thru/or 2mm as shown in this drawing (b), it is difficult to maintain the nip width of face. For example, when a photo conductor drum with a diameter of 84mm is used, in order to maintain the above-mentioned nip width of face, it is necessary to make the amount of interlocking of the belt member to a photo conductor drum or less into 0.01.

[0120] Drawing 17 is explanatory drawing of the relation of the installation gap concerned and breakdown electric field (discharge electric field: v/micrometer) for specifying a gap setup between both in the case of installing an imprint means by non-contact to a belt member. The electric field which this drawing explains the basis of a gap setup at the time of installing a belt member (a middle imprint belt, imprint belt) and an imprint means (a transfer roller, corotron) by non-contact, and are formed between a belt member and an imprint means have proper micrometer in about 10v /.

[0121] The imprint voltage impressed to the imprint means for maintaining the above-mentioned electric field is low, and ends, so that the above-mentioned gap is small. However, if the above-mentioned electric field are maintained and both gap is set to 100 micrometers or more, the voltage impressed to an imprint means will exceed 1kV, discharge will produce it from an imprint

means in a belt member, and an image will be confused.

[0122] Therefore, when the transfer roller has been arranged by non-contact to the belt member, it is necessary to set both gap to 100micro or less. When an imprint means is made into corotron, the gap tolerance of the corotron and the belt member which carry out corona discharge becomes large, and is set to 4 thru/or 10mm. However, in order to prevent the breadth of the corona discharge to the pre nip section, it is necessary to attach a baffle in the upstream discharge section of the corotron concerned.

[0123] By the way, when using a transfer roller as an imprint means, considering as a metal roll is suitable. It is good to use a metal roll with high process tolerance as a transfer roller, for maintaining a gap with the above-mentioned belt member at the precision of 100 micrometers or less, and the diameter has 20 optimalmm or less, and can use aluminum or stainless steel (SUS) as the quality of the material.

[0124] Moreover, the surface of this metal roll may be covered with a high resistance resin film. If the surface is covered with a high resistance resin film, it will be hard coming to generate a discharge phenomenon. As the above-mentioned high resistance resin, PFA, PVdF, nylon, and PC (polycarbonate) are suitable, and, for the thickness of covering of the above-mentioned high resistance resin film, 30 thru/or 100 micrometers, and a volume resistivity are 10^4 . Or 10^9 It is an $\Omega\text{-cm}$ degree.

[0125] In addition, 10^{11} thru/or $10^{13}\text{ohms} / **$ are suitable for the middle imprint hair side of belt side resistance concerned in case a belt member is a middle imprint belt. A charge maintenance property brings about image quality deterioration well by under $10^{11}\text{ohms} / **$. Moreover, if it exceeds $10^{13}\text{ohms} / **$, the current from an imprint means to the imprint nip section stops being able to flow easily, and a proper imprint becomes impossible.

[0126]

[Effect of the Invention] In the image formation equipment which imprints the non-established toner image formed on latent-image support to a record medium through a direct or middle imprint object according to this invention as explained above While vibration of a transfer roller is controlled, and generating of Buller in the pre nip section is prevented and high-definition image formation is made, with the image formation equipment which performs a multicolor heavy imprint The poor imprint resulting from the difference in the amount of electrifications of a toner image by which a multiplex imprint is carried out, such as an imprint omission and lack of an imprint, can be canceled, and a high-definition transfer picture can be obtained.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is a mimetic diagram explaining the important section outline structure of the color printer as the first example of the color picture formation equipment by this invention using a belt-like middle imprint object.

[Drawing 2] It is an important section mimetic diagram explaining the details configuration of the primary imprint portion of the color picture formation equipment by this invention using a belt-like middle imprint object.

[Drawing 3] It is a mimetic diagram explaining the important section outline structure of the color printer as the second example of the color picture formation equipment by this invention using a belt-like middle imprint object.

[Drawing 4] It is an important section mimetic diagram explaining the details configuration of the primary imprint portion of the second example.

[Drawing 5] It is a mimetic diagram explaining the important section outline structure of the color printer as the third example of the color picture formation equipment by this invention using a belt-like middle imprint object.

[Drawing 6] It is an important section mimetic diagram explaining the details configuration of the primary imprint portion of the third example.

[Drawing 7] It is a mimetic diagram explaining the whole color picture formation equipment configuration by this invention.

[Drawing 8] It is a mimetic diagram explaining the important section configuration of the fourth example of this invention which applied this invention to the image formation equipment of the method which imprints directly the toner image formed in the photo conductor drum to a record medium.

[Drawing 9] It is a mimetic diagram explaining the important section configuration of the fifth example of this invention which applied this invention to the image formation equipment of the method which imprints directly the toner image formed in the photo conductor drum to a record medium.

[Drawing 10] It is a mimetic diagram explaining the important section configuration of the sixth example of this invention which applied this invention to the image formation equipment of the method which imprints directly the toner image formed in the photo conductor drum to a record medium.

[Drawing 11] It is a mimetic diagram explaining the whole seventh example configuration of this invention which applied this invention to the color picture formation equipment of the method which carries out the direct pile imprint of the multicolor toner image formed in two or more photo conductor drums at a record medium.

[Drawing 12] It is a mimetic diagram explaining the whole eighth example configuration of this invention which applied this invention to the color picture formation equipment of the method which carries out the direct pile imprint of the multicolor toner image formed in two or more photo conductor drums at a record medium.

[Drawing 13] It is a mimetic diagram explaining the whole ninth example configuration of this invention which applied this invention to the color picture formation equipment of the method

which carries out the direct pile imprint of the multicolor toner image formed in two or more photo conductor drums at a record medium.

[Drawing 14] It is explanatory drawing of the pressure of the imprint nip section, and the relation of the imprint unevenness at the time of a patch pattern (patchy pattern: mottle) imprint.

[Drawing 15] It is explanatory drawing of the pressure of the imprint nip section, and the relation of inside omission imprint unevenness.

[Drawing 16] It is explanatory drawing of the basis of the example corresponding to invention of the 10th of this invention.

[Drawing 17] It is explanatory drawing of the relation of the installation gap concerned and breakdown electric field (discharge electric field: $v/\text{micrometer}$) for specifying a gap setup between both in the case of installing an imprint means by non-contact to a belt member.

[Drawing 18] It is a mimetic diagram explaining the important section outline structure of the color printer as an example of image formation equipment using the belt-like middle imprint object as a belt member.

[Drawing 19] It is explanatory drawing of transition of the amount of electrifications of the toner image of the 1st color (yellow) in the primary imprint cycle on a middle imprint belt.

[Drawing 20] It is explanatory drawing of the amount of toner electrifications on a middle imprint belt, and the relation of optimal secondary imprint voltage.

[Drawing 21] It is a mimetic diagram explaining the physical relationship of the photo conductor drum in the primary imprint section indicated by the conventional technology, a middle imprint belt, and a primary transfer roller.

[Drawing 22] It is explanatory drawing of the relation between the nip pressure of a middle imprint belt and a photo conductor drum, and imprint quality.

[Description of Notations]

1 latent-image support (photo conductor drum) and 2 a belt member (a middle imprint object belt —) An imprint belt, a record-medium conveyance belt, and 2a are a drive roll, 2b, and 2c.... Follower roll, 2d A tension roll, 3 A primary transfer roller, 3' Corotron, 4 A secondary transfer roller, 5 The back up roll, 6 Contact roll, 7 A primary imprint power supply, 8 A secondary imprint power supply, 10 Middle imprint belt cleaner, 11 Record media, such as a transfer paper, 13 An electrification machine, 14 (color) Developer, 17 [.... A fixing assembly, 21 / A discharge tray, 24 / A photo conductor drum cleaner, 25 / Electric discharge machine] REJIROU, 18 A record-medium conveyance belt, 19 An exfoliation pawl, 20

[Translation done.]

* NOTICES *

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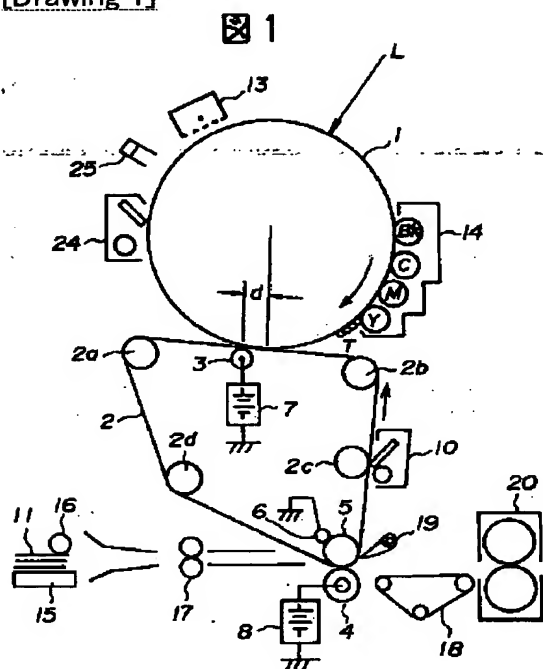
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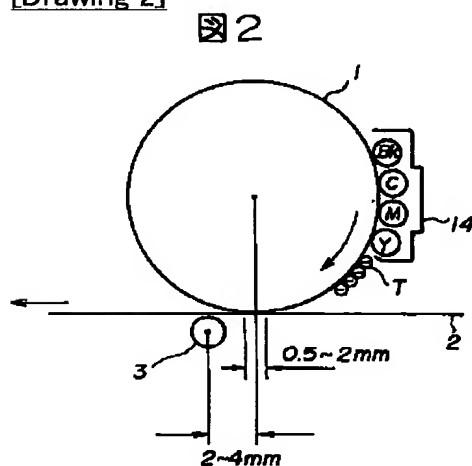
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DRAWINGS

[Drawing 1]

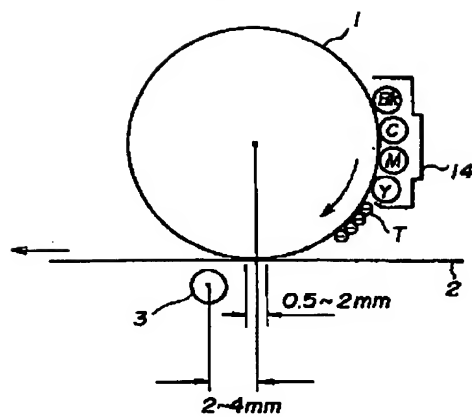


[Drawing 2]



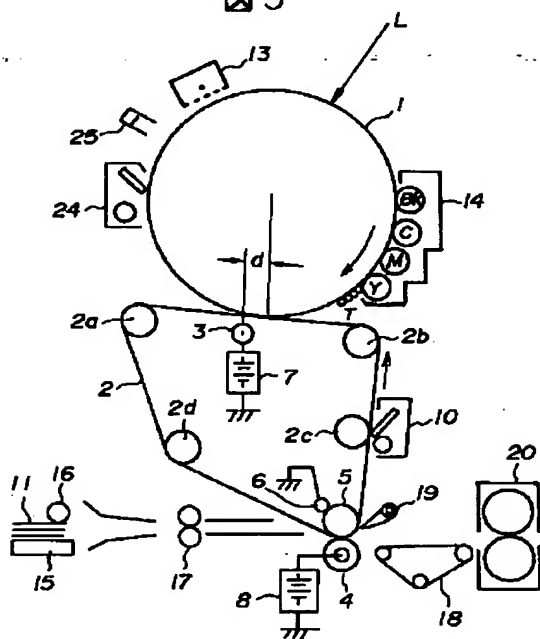
[Drawing 4]

图 4

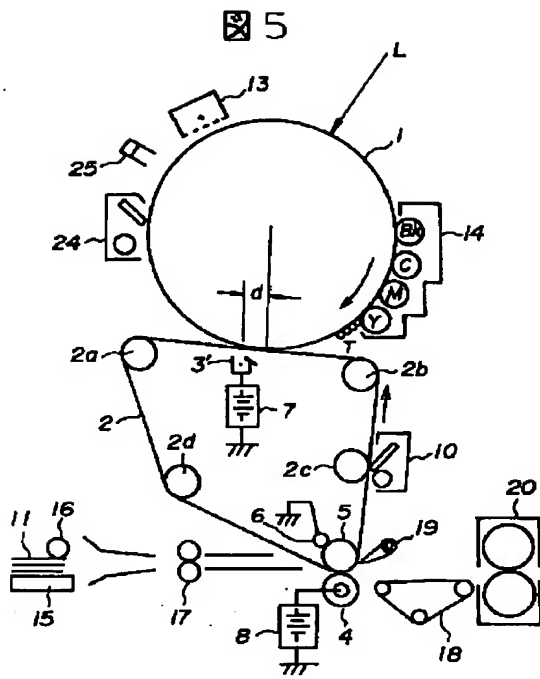


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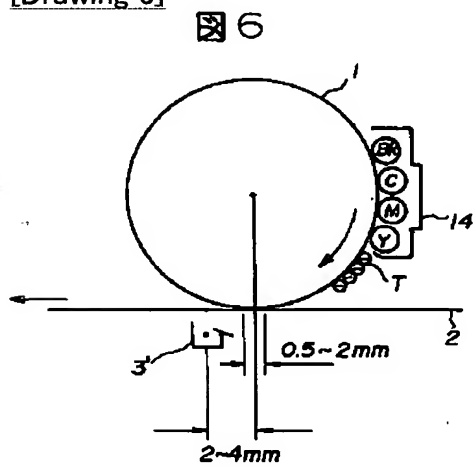
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[Drawing 5]

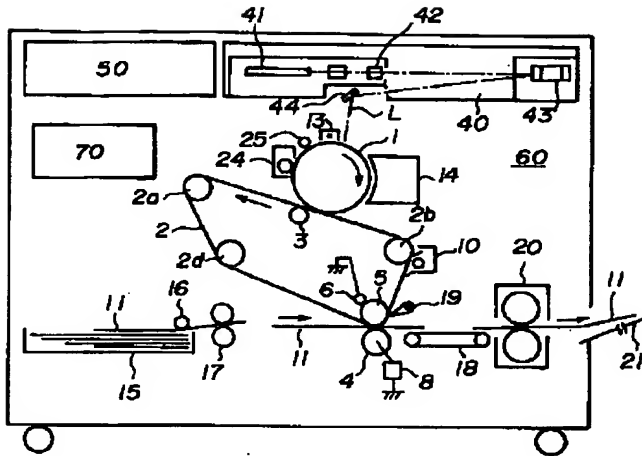


[Drawing 6]



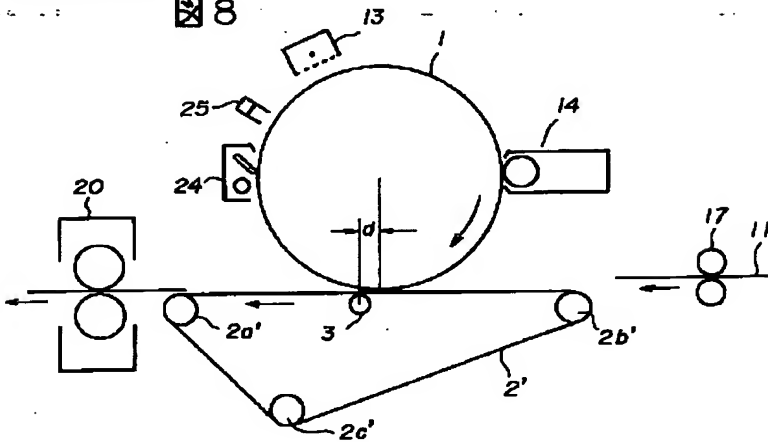
[Drawing 7]

7



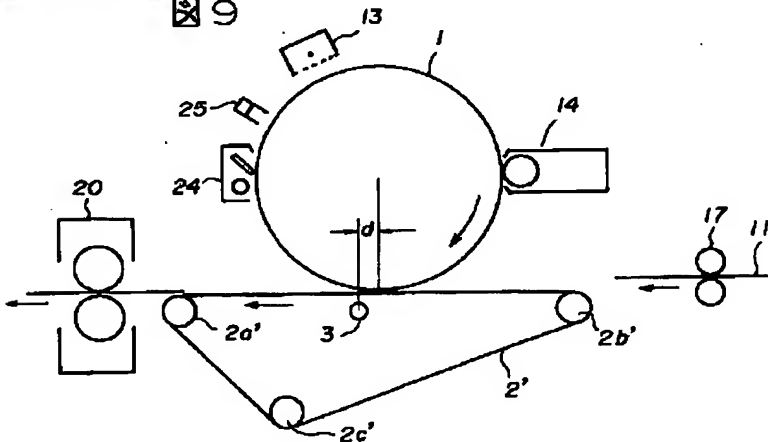
[Drawing 8]

8

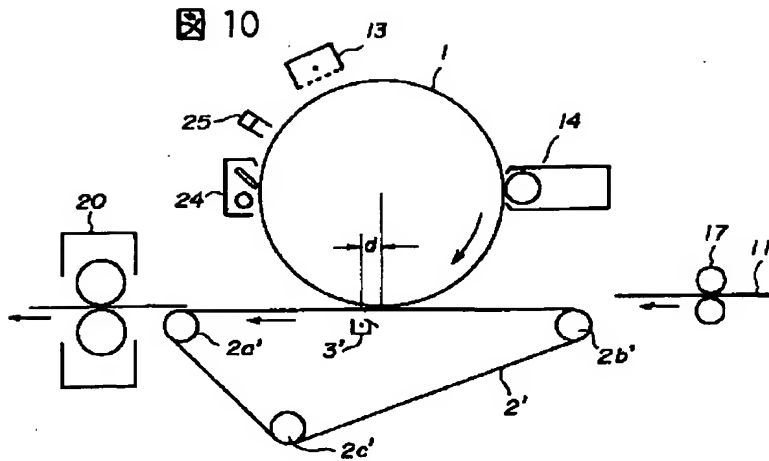


[Drawing 9]

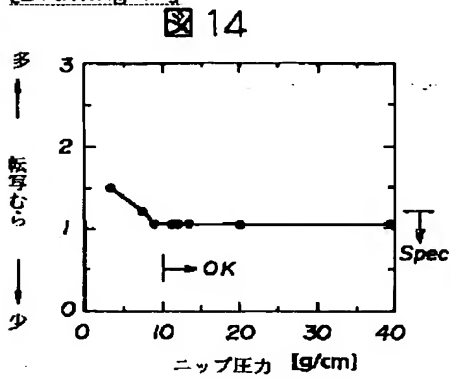
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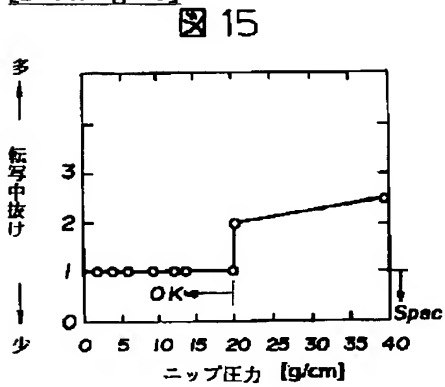
[Drawing 10]



[Drawing 14]

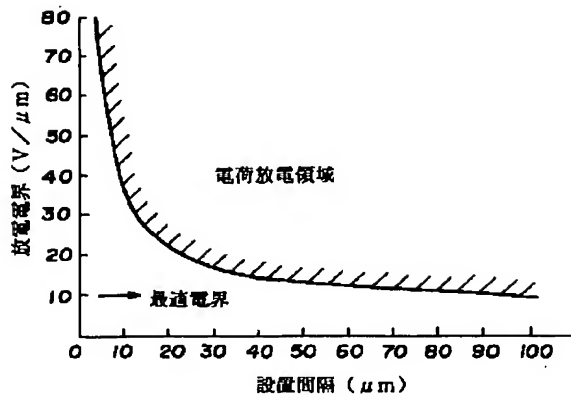


[Drawing 15]



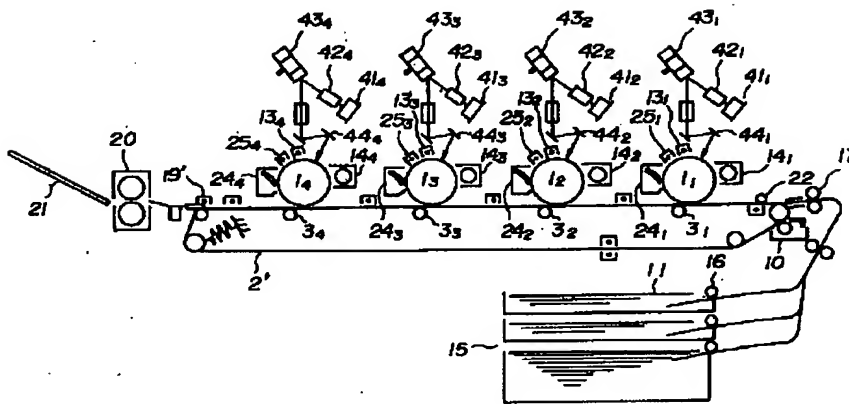
[Drawing 17]

図 17



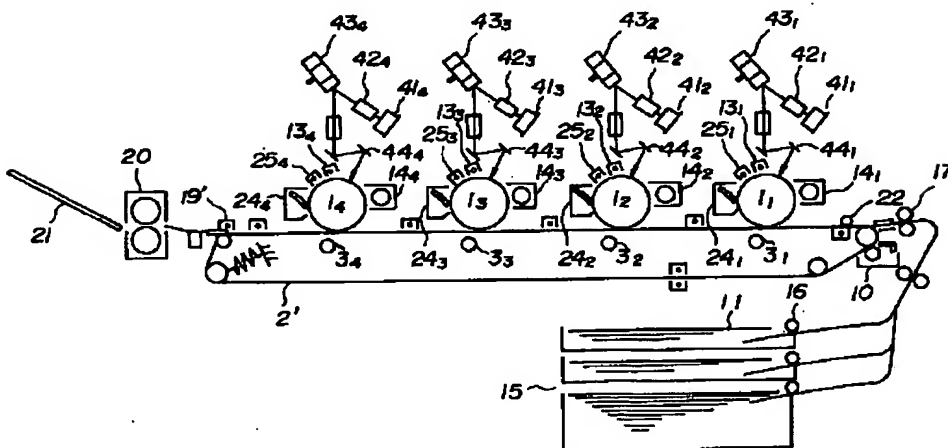
[Drawing 11]

図 11



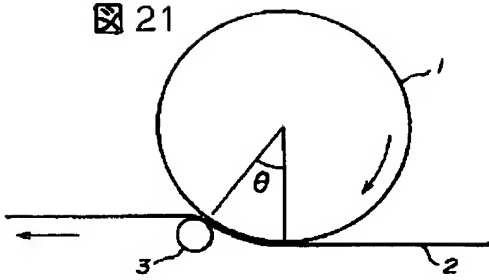
[Drawing 12]

図 12



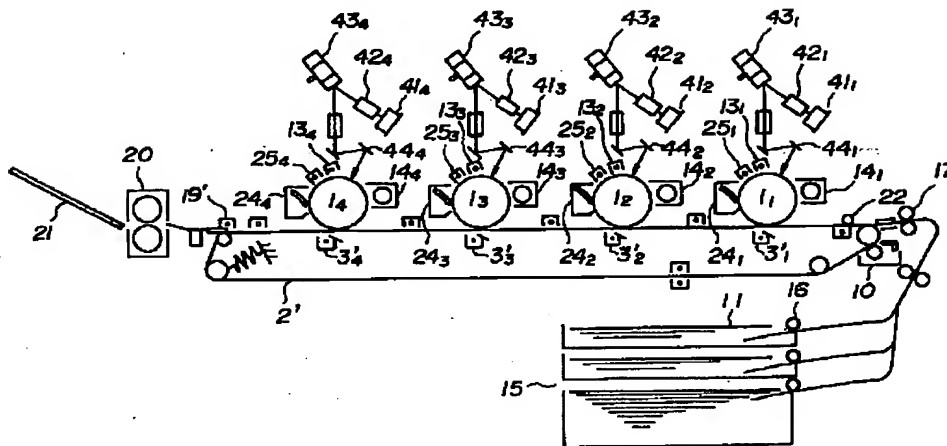
[Drawing 21]

図 21



[Drawing 13]

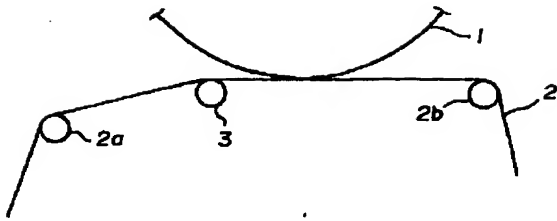
図 13



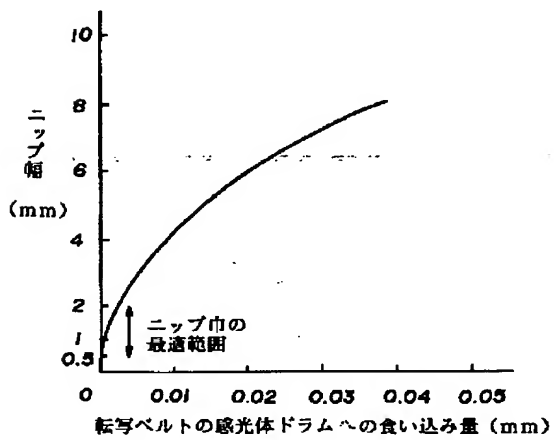
[Drawing 16]

図 16

(a)

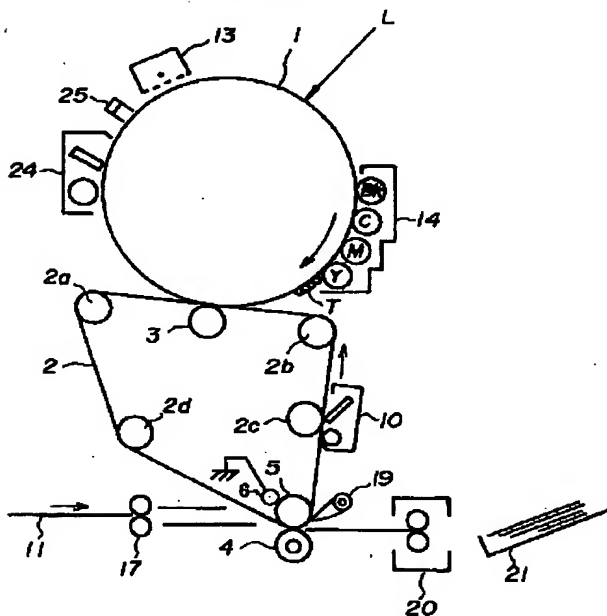


(b)



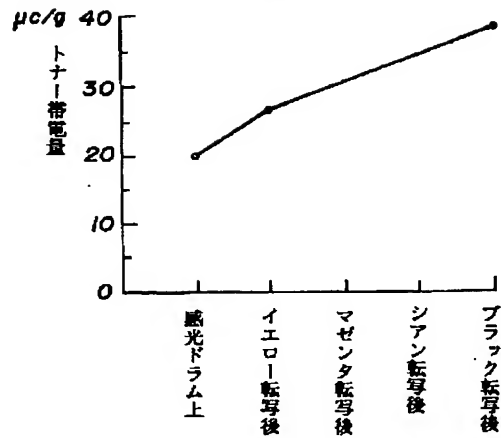
[Drawing 18]

図 18



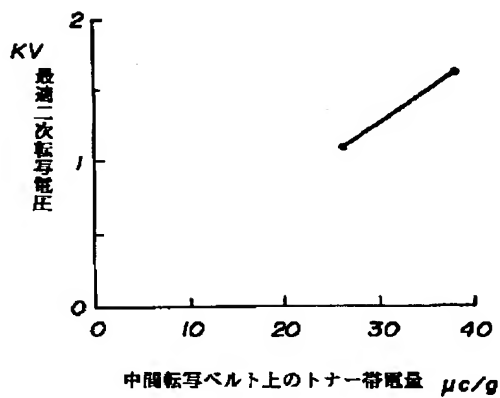
[Drawing 19]

図 19



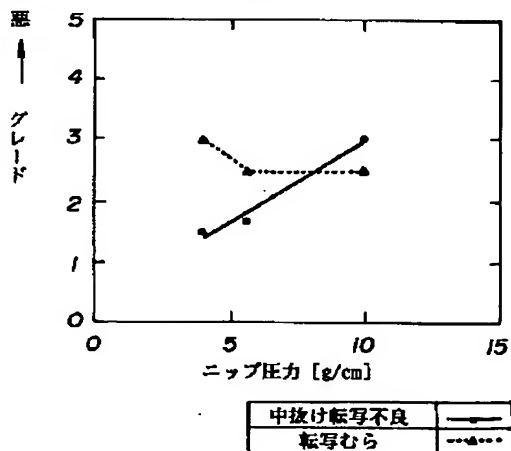
[Drawing 20]

図 20



[Drawing 22]

図 22



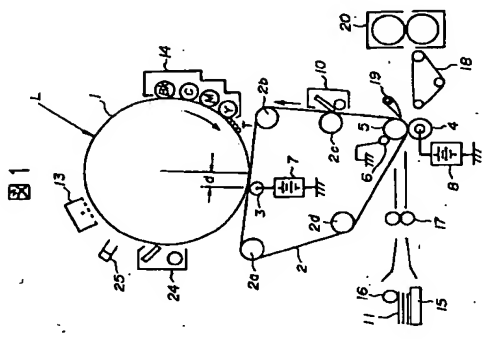
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(54)【発明の名称】 画像形成装置

(57)【要約】
【課題】 ニップ部での転写不良を解消して、高画質の転写画像を得ることのできる画像形成装置を提供する。
【解決手段】 画像信号に応じた潜像を形成する潜像担持体1と、前記潜像を所定のトナーで現像する現像装置14と、潜像担持体1の一部を接触して周回することく配置された潜像担持体1に形成されたトナー像を転写して担持する中間転写体2と、中間転写体2に担持されたトナー像を記録媒体11に一括転写する転写ロール4と、潜像担持体1と前記中間転写体2との接触領域(ニップ部)に近接した下流に配置し、かつ中間転写体2のトナー像担持面の裏面に設置されてトナー像の帯電極性と逆の極性の電圧を印加することにより潜像担持体1との間に転写電界を形成してトナー像を中間転写体2に転写する転写ロール3とを少なくとも備えた。



【請求項14】 請求項13において、前記金属ロールの表面に帯電抑制層を有することを特徴とする画像形成装置。
【請求項15】 請求項3において、前記転写手段の体積抵抗率が 10^4 乃至 $10^9 \Omega \cdot \text{cm}$ としたことを特徴とする画像形成装置。
【請求項16】 画像信号に応じた潜像を形成する感光体ドラムと、前記潜像を所定のカラーカートナーで現像するカラー現像装置と、前記感光体ドラムの一部を接触して周回することく配置されて前記感光体ドラムに各色毎に順次形成された各色のトナー像を順次転写しフルカラートナー像として担持する中間転写ベルトと、前記中間転写ベルトに担持されたフルカラートナー像を記録媒体に一括転写する二次転写ロールと、前記感光体ドラムと前記中間転写ベルトとの接触領域に近接した下流に配置し、かつ前記中間転写ベルトのトナー像担持面の裏面に、かつ前記中間転写ベルトとの間に転写電界を形成して前記トナー像を前記中間転写ベルトに一次転写する前記中間転写ベルトと接触配置された一次転写ロールとを少なくとも備えたことを特徴とするカラー画像形成装置。
【請求項17】 画像信号に応じた潜像を形成する感光体ドラムと、前記潜像を所定のカラーカートナーで現像するカラー現像装置と、前記感光体ドラムの一部を接触して周回することく配置されて前記感光体ドラムに各色毎に順次形成された各色のトナー像を順次転写しフルカラートナー像として担持する中間転写ベルトと、前記中間転写ベルトに担持されたフルカラートナー像を記録媒体に一括転写する二次転写ロールと、前記感光体ドラムと前記中間転写ベルトとの接触領域に近接した下流に配置し、かつ前記中間転写ベルトのトナー像担持面の裏面に、かつ前記中間転写ベルトとの間に転写電界を形成して前記トナー像の帯電極性と逆の極性の電圧を印加することにより前記感光体ドラムとの間に転写電界を形成して前記トナー像を前記中間転写ベルトに一次転写する前記中間転写ベルトと非接触に配置された一次転写ロールとの接触領域に近接した下流に配置し、かつ前記中間転写ベルトのトナー像の帯電極性と逆の極性の電圧を印加することにより前記感光体ドラムとの間に転写電界を形成する前記中間転写ベルトと接触配置された二次転写ロールとを少なくとも備えたことを特徴とする画像形成装置。
【請求項18】 画像信号に応じた潜像を形成する感光体ドラムと、前記潜像を所定のカラーカートナーで現像するカラー現像装置と、前記感光体ドラムの一部を接触して周回することく配置されて前記感光体ドラムに形成された前記所定のカラートナー像を転写する記録媒体を搬送する転写ベルトと、前記感光体ドラムと前記転写ベルトとの接触領域に近接した下流に配置し、かつ前記転写ベルトの配電媒体設置面の裏面に前記トナー像の帯電極性と逆の極性の電圧を印加することにより前記感光体ドラムとの間に転写電界を形成する前記転写ベルトと接触配置された転写ロールとを少なくとも備えたことを特徴とする画像形成装置。
【請求項19】 画像信号に応じた潜像を形成する感光

体ドラムと、前記潜像を所定のカラーナートナーで現像するカラー現像装置と、前記感光体ドラム上に一部を接触して周回することく配置された前記感光体ドラム11に形成された前記所定のカラーナートナー像を転写する転写装置と、前記感光体ドラムと前記転写装置との接触領域に近接した下流に配置し、かつ前記感光体ドラム11の感光体表面の裏面に前記トナー像の帯電極性と逆の極性の電圧を印加することにより前記感光体ドラムとの間に転写電界を形成する前記転写装置と前記感光体ドラムとを少なくとも備えたことを特徴とする画像形成装置。

【請求項20】 複色の画像信号の各一つに応じた潜像をそれぞれ形成する複色の感光体ドラムと、前記複色の感光体ドラム11のそれぞれに設けられて各潜像を所定のカラーナートナーで現像する複色のカラー現像装置と、前記感光体ドラム11のそれぞれに一部を接触して周回することく配置された前記感光体ドラム11のそれぞれに形成された各カラーナートナー像を転写することく配置された前記転写装置と、前記感光体ドラムと前記転写装置との接触領域に近接した下流に配置し、かつ前記感光体ドラム11の感光体表面の裏面に前記トナー像の帯電極性と逆の極性の電圧を印加することにより前記感光体ドラムとの間に転写電界を形成する前記転写装置と前記感光体ドラムとを少なくとも備えたことを特徴とするカラー画像形成装置。

【請求項21】 複色の画像信号の各一つに応じた潜像をそれぞれ形成する複色の感光体ドラムと、前記複色の感光体ドラム11のそれぞれに設けられて各潜像を所定のカラーナートナーで現像する複色のカラー現像装置と、前記感光体ドラム11のそれぞれに一部を接触して周回することく配置された前記感光体ドラム11のそれぞれに形成された各カラーナートナー像を転写することく配置された前記転写装置と、前記感光体ドラムと前記転写装置との接触領域に近接した下流に配置し、かつ前記感光体ドラム11の感光体表面の裏面に前記トナー像の帯電極性と逆の極性の電圧を印加することにより前記感光体ドラムとの間に転写電界を形成する前記転写装置と前記感光体ドラムとを少なくとも備えたことを特徴とするカラー画像形成装置。

【発明の詳細な説明】

【0001】
【発明の属する技術分野】 本発明は、電子写真方式の複写機やプリンタ等の画像形成装置に係り、特に潜像保持体上に形成した未定着トナー像をベルト部材で搬送される転写装置に直接あるいはベルト状の中間転写体を介して転写装置に転写する画像形成装置に関する。

【0002】
【従来の技術】 電子写真方式の複写機やプリンタ等の画像形成装置における転写方法として、感光体ドラム等の潜像保持体上に形成されたトナー像をベルト部材の搬送

体で搬送される転写装置に直接転写する方式と、潜像保持体上に形成されたトナー像を一旦ドラム状あるいは無端フィルム状のベルト部材からなる中間転写体上に一次転写した後、前記中間転写体上のトナー像を改めて転写媒体上へ二次転写して複写画像を得る方式とが知られている。

【0003】 なお、以下の説明においては、上記ベルト状中間転写体を用いた画像形成装置の一例としてのカラープリンタの要部概略構造を説明する模式図であって、1は潜像保持体（ここでは、感光体ドラム）、2はベルト部材であるベルト状中間転写体（以下、中間転写体と略す）、2aは駆動ロール、2b、2cは送動ロール、2dはテンションロール、3は一次転写ロール、4は二次転写ロール、5は中間転写ベルト2の周回搬送手段を構成すると共に二次転写ロール4の対向電極となるバックアップロール5、10は中間転写ベルト2と前記転写装置との接触領域に近接した下流に配置し、かつ前記感光体ドラム11の感光体表面の裏面に前記トナー像の帯電極性と逆の極性の電圧を印加することにより前記感光体ドラムとの間に転写電界を形成する前記転写装置と前記感光体ドラムとを少なくとも備えたことを特徴とする画像形成装置。

【請求項20】 複色の画像信号の各一つに応じた潜像をそれぞれ形成する複色の感光体ドラムと、前記複色の感光体ドラム11のそれぞれに設けられて各潜像を所定のカラーナートナーで現像する複色のカラー現像装置と、前記感光体ドラム11のそれぞれに一部を接触して周回することく配置された前記感光体ドラム11のそれぞれに形成された各カラーナートナー像を転写することく配置された前記転写装置と、前記感光体ドラムと前記転写装置との接触領域に近接した下流に配置し、かつ前記感光体ドラム11の感光体表面の裏面に前記トナー像の帯電極性と逆の極性の電圧を印加することにより前記感光体ドラムとの間に転写電界を形成する前記転写装置と前記感光体ドラムとを少なくとも備えたことを特徴とするカラー画像形成装置。

【請求項21】 複色の画像信号の各一つに応じた潜像をそれぞれ形成する複色の感光体ドラムと、前記複色の感光体ドラム11のそれぞれに設けられて各潜像を所定のカラーナートナーで現像する複色のカラー現像装置と、前記感光体ドラム11のそれぞれに一部を接触して周回することく配置された前記感光体ドラム11のそれぞれに形成された各カラーナートナー像を転写することく配置された前記転写装置と、前記感光体ドラムと前記転写装置との接触領域に近接した下流に配置し、かつ前記感光体ドラム11の感光体表面の裏面に前記トナー像の帯電極性と逆の極性の電圧を印加することにより前記感光体ドラムとの間に転写電界を形成する前記転写装置と前記感光体ドラムとを少なくとも備えたことを特徴とするカラー画像形成装置。

【0004】 同図において、感光体ドラム11の表面は帯電器13により所定の極性の電荷で一様に帯電され、第1色の画像信号2（例えば、イエロー）の画像に応じた静電潜像が形成される。この静電潜像は、感光体ドラム11の回転で現像装置14の搬送位置に到り、第1色の現像剤を担持してさらに転写される。

【0005】 上記トナー像形成動作に合わせて、中間転写ベルト2は感光体ドラム11の周速と略同速で移動し、感光体ドラム11と中間転写ベルト2とが当接する位置（ニップ）の直下で中間転写ベルト2に接して配置された一次転写ロール3で構成される一次転写部において、当接した感光体ドラム11に形成されたトナー像の帯電極性と逆の極性の電圧を印加することにより感光体ドラム11に担持されたトナー像が中間転写ベルト2に一次転写される（一次転写サイクリング）。

【0006】 中間転写ベルト2に一次転写されたトナー像は中間転写ベルト3の周回移動で二次転写ロール4が配置されている二次転写部3に到る。フルカラー複写機の場合は、上記した潜像の形成からトナー像の一次転写ま

でも所要の色（一般には、イエロー：Y、サイアン：C、マゼンタ：M、黒：BK）分だけ繰り返して中間転写ベルト2上に多色トナーを重ね合わせたカラーナートナー像を形成する。

【0007】 すなわち、カラー画像形成装置では、現像装置14は一般にBk現像剤、サイアン現像剤、マゼンタ現像剤、イエロー現像剤の4色現像剤から構成され、感光体ドラム11に形成された4色の潜像を順次現像し、その後に各色トナーの現像剤が現像部位に選択的に位置されるか、あるいは現像位置が感光体ドラム11の周りに順次搬送される。

【0008】 感光体ドラム11に担持された第1色のトナー像は一次転写部3の位置で中間転写ベルト2上に転写した後、感光体ドラム11は潜像担持体クリナー24で残留トナーの除去がなされると共に除電器25で電荷が中和された後、次の第2色（例えば、マゼンタ）の静電潜像も同様に現像され、その第2色のトナー像が中間転写ベルト2の先に転写された第1色のトナー像に重ねて転写される。

【0009】 以下、第3色（サイアン）、第4色（ブラック）についても同様にして中間転写ベルト2上に多色転写され、その結果、中間転写ベルト2には未定着の複色のトナーが重畳したカラーナートナー像が形成される（二次転写サイクリング）。なお、このとき、最終トナー像の転写が終了するまで、二次転写ロール4や中間転写体クリナー10、剥離輪は中間転写ベルト2から搬送された位置にある。

【0010】 そして、全ての必要色のトナー像が一次転写された中間転写ベルト2が二次転写ロール4の位置に達する時点で、トナーから取り出されてレジロール17でタミミングを取って送り出された転写体11が中間転写ベルト2と二次転写ロール4の間に搬送される。転写体11を二次転写ロール4と中間転写ベルト2およびバックアップロール5により保持して搬送する際に、二次転写ロール4と中間転写ベルト2の間に印加されるトナー像の帯電極性と逆極性の転写電圧で形成される転写電界により中間転写ベルト2上のトナー像が転写体11に二次転写される。

【0011】 二次転写ロール4は導電性材料からなり、図示しない転写電圧源から所定の転写電圧が印加される。例えば、二次転写ロール4に転写電圧源を接続し、バックアップロール4に接して回転するように配置されたコンタクトロール6を接地に接続して転写電圧源を形成する。なお、コンタクトロール6に転写電圧源を接続し、二次転写ロール4側を接地する構成としてもよい。

【0012】 トナー像が二次転写された転写体11は、剥離輪19で中間転写ベルト2から剥離され、定着器20に送られる。定着器20は一定の定着ロールの間に転写体11を通過させる時に、転写体11を加熱/加圧

処理してトナー像を固定し、排出トレー21に排出し、作像プロセスを終了する。二次転写が終了した中間転写ベルト2は中間転写体クリナー10を通過する時に残留トナーの除去がなされ、次の画像形成動作に関与する。

【0013】 このような中間転写ベルト2を用いたカラー画像形成装置では、既に多重転写のなされた合成トナー像（各色トナー像の重畳像）を転写媒体11に一括で転写しているため、潜像担持体1から直接転写媒体に各色のトナー像を順次転写する方式におけるトナー像の位置ずれや画像の乱れの発生を効果的に防止することができるといった利点を有している。

【0014】 従来、この種の画像形成装置としては、特開平6-95521号公報に記載のもの知られている。

【0015】

【説明が解決しようとする課題】 上記の作像プロセスの一次転写部において、中間転写ベルト上に最初に転写されたトナー像（イエロー）は第2色のトナー像（マゼンタ）、第3色のトナー像（サイアン）および第4色のトナー像（ブラック）の各トナー像を順次転写するときに転写電界を受け、転写各色のトナー像の転写にその帯電量が減少して行く。

【0016】 図19は中間転写ベルト上の一次転写サイクリングにおける第1色（イエロー）のトナー像の帯電量の推移の説明図である。同図に示されたように、中間転写ベルト2に一次転写された第1色であるイエローのトナー像は、その後の第2色（マゼンタ）、第3色（サイアン）、第4色（ブラック）の一次転写の移行ごとにその帯電量が減少して行く。

【0017】 また、第2色（マゼンタ）のトナー像が中間転写ベルト2上の第1色のイエロー像に重ねて、また中間転写ベルト2上の第1色のイエロー像が無い部分に一次転写された後、第3色（サイアン）、第4色（ブラック）の一次転写の移行ごとにその帯電量が減少して行く。同様に、第3色（サイアン）のトナー像が一次転写された後、第4色（ブラック）の一次転写の移行ごとにその帯電量が減少して行く。

【0018】 しかし、最終色の第4色（ブラック）のトナー像は、他のトナーの転写がないので、一次転写時の帯電量を維持する。このように、中間転写ベルト2上に一次転写された4色のカラーナートナー像は、図示したように、最大がイエローで、以下マゼンタ、サイアン、ブラックの順でトナー帯電量が低くなっていく。

【0019】 二次転写では、上記した帯電量の異なる複数のトナー像を転写媒体に一括して転写することになるが、この二次転写における中間転写ベルト2上のトナー像に対する最速転写率はトナーの帯電量によって異なるものである。図20は中間転写ベルト上のトナー帯電量と最速二次転写電圧の関係の説明図であって、横軸に中間転写ベルト上のトナー帯電量（ $\mu\text{m/g}$ ）を、縦軸に

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駆写ベルトをたわませる為、一次駆写ニップ圧が高くな
ってしまふ。図22は中間駆写ベルトと感光体ドラムと
のニップ圧力と駆写品質との関係の説明図であつて、横
軸にニップ圧力 (g/cm) を、縦軸に駆写品質のグレ
ードを取つて示してある。

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【0027】 図同に実験で示したように、中間駆写ベ
ルトと感光体ドラムとのニップ圧力が大きくなると中接
駆写不良の発生も増大する。また、ニップ圧力がある値
より低くすると同図実験で示したように、駆写むらの発
生が増大する。また、感光体ドラムと中間駆写ベルトの
ニップの直下に駆写部材が設置されているために、感光
体ドラムと中間駆写ベルトの押接移動に伴つて駆写部材
に振動が発生し、その振動が前記ニップ圧力の変動を生
み、駆写むらが発生する。

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【0028】 さらに、感光体ドラムと中間駆写ベルトの
ニップ部に近接した上流領域 (プレニップ部) に駆写部
材からの電界がおよび、これがトナーの飛散 (所謂、プ
ラー) の発生原因となり、画質劣化をもたらす。なお、
上記では潜像担持体に形成したトナー像を中間駆写ベ
ルトを介して記録媒体に転写する方式についての説明し
たが、複色の潜像担持体にそれぞれ形成した多色のトナ
ー像のそれぞれを用紙搬送ベルト上に載置吸着してカンデ
ラに搬送する記録媒体に順次重ね転写する方式のカラー
画像形成装置、およびカラーに限らず、感光体ドラム等
の潜像担持体に対してベルトまたはフィルム上等およ
びこれに準じた駆写ベルト (ベルト部材) を接触させて
トナー像の転写を直接記録媒体に転写を行う方式のモノ
クロ等の画像形成装置においても同様である。

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【0029】 以上のように、従来の技術においては、潜
像担持体とベルト部材のニップ直下に転写手段が設置さ
れているために、潜像担持体とベルト部材の押接移動に
伴つて転写部材に振動が発生し、これがニップ圧の変動
をもたらして転写むらが発生する。さらに、潜像担持体
とベルト部材のニップ部に近接した上流に駆写部材から
の電界がおよび、これがプラーの発生原因となり、画質
劣化をもたらすという問題があつた。

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【0030】 さらに、フルカラーの画像形成装置では、
複色のトナーの帯電量が相違するために最速駆写電圧
の設定が困難となるという問題があつた。本発明の目的
は、上記従来技術の問題を解消し、中間駆写体や記録
媒体搬送部材、あるいは転写手段としてベルト部材を用
いた方式における駆写不良を解消して、高画質の転写画
像を得ることのできる画像形成装置を提供することにあ
る。

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【0031】
【課題を解決するための手段】 上記目的を達成するため
に、請求項1に記載の第1の発明は、画像信号に応じた潜
像像を形成する潜像担持体と、前記潜像像を所定のトナー
で現像する現像装置と、前記潜像担持体の一部を接触し
て配置されるベルト部材と、前記ベルト部材の前記潜像

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間隔を100 μ m以内としたことを特徴とする。この構
成により、前記ベルト部材と前記転写手段との間の放電
を抑制し、画像劣れの無い高画質の画像を得ることがで
きる。

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【0038】 さらに、請求項12に記載の第13の発明
は、第7の発明における前記コロトロン部材の移動方向にペッ
材と対向する当該ベルト部材の移動方向上流側にペッ
ル板を設置したことを特徴とする。この構成により、前
記静電潜像担持体と前記ベルト部材の接触開始領域への
電界侵入が抑制され、プレニップ部への電界侵入による
画像劣れが回避され、高画質の画像を得ることができ
る。

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【0039】 さらに、請求項13に記載の第13の発明
は、第11の発明における前記転写手段を金属ロールで
構成したことを特徴とする。この構成において、前記転
写手段が金属ロールとすること、金属ロールの表面加工
精度を向上でき、ベルト部材との間の設置間隔を精密
に設定することができる。

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【0040】 さらに、請求項14に記載の第14の発明
は、第13の発明における前記金属ロールの表面に高低
抗脂層を有することを特徴とする。この構成により、
ベルト部材との間の放電を回避でき、転写部材の放電の
発生に起因する画質劣化が抑制される。さらに、請求項
15に記載の第15の発明は、第3の発明における前記
転写手段の体積抵抗値を104乃至109 $\Omega \cdot cm$ とし
たことを特徴とする。

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【0041】 この構成により、転写電界を形成するため
の印加電圧でベルト部材ととの間の放電を回避でき、高画
質の画像形成が可能となる。さらに、請求項16に記載
の第16の発明は、画像信号に応じた潜像を形成する感
光体ドラムと、前記潜像像を所定のカラートナーで現像す
るカラー現象装置と、前記感光体ドラムに一部を接触し
て周回することく配置されて前記感光体ドラムに各色毎
に順次形成された各色のトナー像を順次転写しフルカラ
ートナー像として保持する中間転写ベルトと、前記中間
転写ベルトに保持されたフルカラートナー像を記録媒体
に一括転写する二次転写ロールと、前記感光体ドラムと
前記中間転写ベルトとの接触領域に近接した下流に配置
し、かつ前記中間転写ベルトのトナー像担持体の裏面に
、かつ前記中間転写ベルトのトナー像を印加するこ
とにより前記潜像担持体ととの間に転写電界を形成して前
記トナー像を前記中間転写ベルトに一次転写する前記中
間転写ベルトと前記中間転写ベルトに一次転写する少な
くとも備えたことを特徴とする。

【0042】 この構成において、感光体ドラムは所定の
極性で一様に帯電された後、所定色の画像信号に応じた潜
像像を形成する。カラー現象装置は所定の複色のトナー
を有する複数のトナー現像器を有し、前記潜像像を所定の
トナーで現像する。

25 μA で良好な転写性が得られた。
【0080】一次転写ロール3の体積抵抗率は $1.04 \sim 1.09 \Omega \cdot \text{cm}$ が好適であり、その材料はスポンジ状の発泡性シリコンゴムで、硬度は $2.5 \sim 4.5$ (アスカC測定) のものを用いる。なお、一次転写ロール3の材料は、この他にEPDM、ポリウレタン等の材料も、上記の各値を満足するものであれば使用できる。

【0081】本実施例では、一次転写ロール3の径は20mm、感光体ドラム1の径は84mmである。上記構成で、一次転写を行うと、二次転写において二次転写ロール3に印加する一次転写電圧をプラス1.6KVにし、良好な面像が得られる。これは、中間転写ベルト2上のトナー像が第1色であるイエローから最終色であるブルーックまで、その帯電量が安定しているからである。

【0082】上記帯電量の安定化は、一次転写部における感光体ドラムから中間転写ベルトが剥離する部分での転写電界傾度が一次転写ロールから感光体ドラムと中間転写ベルトとの接触部までであり、上記剥離部において剥離電界が強まり、その剥離放電により中間転写ベルト20上のトナー像の帯電量が増加することによる。また、一次転写ロール3と中間転写ベルト2との距離が100 μm 以内であれば、両者を非接触とした場合でも良好な転写性が得られる。

【0083】図3はベルト状の中間転写体を用いた本発明によるカラー画像形成装置の第二実施例としてのカラープリンターの要部回路構造を説明する模式図、図4は第一実施例の一次転写部分の詳細構成を説明する要部回路図であって、図1と同一符号は同一部分に対応する。この実施例は、一次転写ロール3を中間転写ベルト2の表面に非接触で配置した構成を除いて、前記図1と同様の構成である。

【0084】この実施例においては、一次転写ロール3は、ニップ部中央から2乃至4mm下流に非接触で配置され、中間転写ベルト2との距離が100 μm 以内となるように非接触の位置に設置される。このときの一次転写ロール3は定電流制御で、電流値を15 $\sim 25 \mu\text{A}$ とすればよい。

【0085】本実施例でも上記第1実施例と同様に、高画質の面像形成が可能となる。図5はベルト状の中間転写体を用いた本発明によるカラー画像形成装置の第三実施例としてのカラープリンターの要部回路構造を説明する模式図、図6は第三実施例の一次転写部分の詳細構成を説明する要部回路図であって、図3と同一符号は同一部分に対応する。

【0086】この実施例は、一次転写手段としてコロロン3'を中間転写ベルト2の裏面に非接触で配置した構成を除いて、前記図3と同様の構成である。この実施例においては、コロロン3'は、ニップ部中央から2乃至4mm下流に非接触で配置される。本実施例でも上記第1実施例と同様に、高画質の面像形成が可能となる

【0074】二次転写が終了した中間転写ベルト2は中間転写体クリナー10を通過する時に残留トナーの除去がなされ、次の画像形成動作に備える。図2はベルト状の中間転写体を用いた本発明によるカラー画像形成装置の一次転写部分の詳細構成を説明する要部回路図であって、図1と同一符号は同一部分に対応する。

【0075】図2において、感光体ドラム1の表面には現像装置14によりマイナスイオン極性に帯電されたトナー像1が形成されている。中間転写ベルト2はポリイミド系樹脂で構成され、その厚みは60 $\sim 90 \mu\text{m}$ 、体積抵抗率は $1.09 \sim 1.0^{12} \Omega \cdot \text{cm}$ 、表面抵抗率は $1.0^{11} \sim 1.0^{13} \Omega / \square$ に調整された半導電性の樹脂フィルムである。

【0076】この中間転写ベルト2は、厚み、体積抵抗率、表面抵抗率が上記の値の範囲に入っている半導電性樹脂材料なら使用可能であり、この他にアクリル系樹脂、強化ビニル系樹脂、ポリエステル系樹脂、あるいはポーカーボネート系樹脂等に抵抗安定化材料を含有させたものでも使用できる。さて、言い換えるれば、一次転写部における中間転写ベルト2は感光体ドラム1の表面の接合部に配置する。つまり、中間転写ベルト2の裏面の感光体ドラム1への接触力はほとんど0になる。少しでも中間転写ベルト2を感光体ドラム1にラップさせると、接触圧は非常に高くなってしまふ。

【0077】一次転写部における感光体ドラム1と中間転写ベルト2との接触圧は、一次転写ロール3を図示しないバッキングによって図の上方に押し上げることにによって得られる。この圧力は10 $\sim 20 \text{ kg/cm}$ が好適であり、これより接触圧が高くなり転写不良が発生する。また接触圧が低いと転写むらが生じる。

【0078】したがって、中間転写ベルト2と感光体ドラム1との接触層(ニップ層)は0.5 $\sim 2 \text{ mm}$ 程度となる。一次転写ロール3は感光体ドラム1と中間転写ベルト2との接触層中央より2 $\sim 4 \text{ mm}$ プロセス方向下流に配置する。転写作用は転写電流が一次転写ロール3から半導電性の中間転写ベルト2に伝わって、感光体ドラム1と中間転写ベルト2との接触傾斜に流れ込むことにより行われる。

【0079】感光体ドラム1の上流のマイナス帯電トナー像を転写するため、一次転写ロール3にはプラス電圧を印加するが、一次転写ロール3の底抗のばらつき、中間転写ベルト2の底抗のばらつき、トナーの帯電のばらつき等があるので、転写電界の制御は定電流制御を採用した方が望ましい。本実施例では、転写電流が15 ~ 50

【0068】一次転写ロール3は感光体ドラム1と中間転写ベルト2の接触部分(ニップ部)中央から当数個中間転写ベルト2の下流側にd(2乃至4mm)だけ離間し、かつ当該中間転写ベルト22にのみ接する部分に配置される。上記ニップ部の圧力すなわちニップ圧は10乃至20 kg/cm に設定される。中間転写ベルト2に一次転写されたトナー像は中間転写ベルト2の周囲移動で二次転写ロール4が配置されている二次転写部に到る。

【0069】フルカラー複写機の場合は、上記した漸像の形成からトナー像の一次転写までを所要の色(一般には、イエロー：Y、サイアン：C、マゼンタ：M、黒：BK)分だけ繰り返して中間転写ベルト2上に多色トナーを重ね合わせたカラートナー像を形成する。すなわち、カラー画像形成装置では、現像装置14は一般にサイアン現像器、マゼンタ現像器、イエロー現像器、BK現像器の4色現像器から構成され、感光体ドラム1に形成された各色の漸像を順次現像できるように各色トナーの現像器が現像部に選択的に位置されるか、あるいは現像位置が感光体ドラム1の周りに順次配置される。

【0070】感光体ドラム1に相対した第1色のトナー像は一次転写器3の位置で中間転写ベルト2上に転写した後、感光体ドラム1は漸像担持体クリナー24で残留トナーの除去がなされると共に除電器25で電荷が中和された後、次の第2色に対応する漸像の形成がなされる。第2色(例えば、マゼンタ)の静電層も同様にして現像され、その第2色のトナー像が中間転写ベルト2の先に転写された第1色のトナー像に重ねて転写される。

【0071】以下、第3色(サイアン)、第4色(ブラック)についても同様に中間転写ベルト2に多量転写され、その結果、中間転写ベルト2には未定数の複数色トナーが重畳したカラートナー像が形成される(二次転写サイク)。なお、このとき、最終トナー像の転写が終了するまで、二次転写ロール4や中間転写体クリナー10、剥離爪は中間転写ベルト2から遊離された位置にある。

【0072】そして、全ての必要な色のトナー像が一次転写された中間転写ベルト2が二次転写ロール4の位置に達する時点で、トナー15から取り出されてレジロール17でタイミングを取って送り出される配電媒体11が中間転写ベルト2と二次転写ロール4の間に給送される。配電媒体11を二次転写ロール4と中間転写ベルト2およびバックアップロール5により保持して搬送する際に、二次転写ロール4と中間転写ベルト2の間に二次転写電源8から印加される上記トナー像の帯電極性逆極性の転写電圧が形成される転写電界により中間転写ベルト2上のトナー像が配電媒体11に一括して二次転写される。

【0073】トナー像が二次転写された配電媒体11は

した無極性トナ材であるが、これに限るものではなく、ドラム状に支持した構成としたものでもよい。

【0062】さらに、前記第2乃至第21の発明において、転写ロール上に搬送して搬送する転写電界の配電媒体上に複数の漸像担持体(感光体ドラム)にそれぞれ担持させた複数のトナー像を当該漸像担持体の搬送に従って順次重ねて転写する形式のカラー画像形成装置においては、全ての感光体ドラムの転写電圧を転写手段をニップ部下流に配置する構成としたが、本発明はこれに限るものではなく、その1または2あるいは3のみに、若しくは転写電界が高い最終の転写部位のニップ部に配置する転写部材(転写ロールあるいはコロロン)のみを上記ニップ部下流に配置する構成としてもよい。

【0063】本発明によれば、漸像担持体に担持されたトナー像を転写する転写ロールを当該漸像担持体と中間転写ベルトとあるいは転写ベルトなどの転写体との接触部位(ニップ)の下流側に配置したことにより、上記転写体と漸像担持体とが離れる領域における剥離放電が大きくなり、転写された複数のトナー像の中で最も帯電量が少ない最終転写トナーの帯電量が増大され、配電媒体への最終転写あるいは配電媒体への直接転写時の転写不良が防止される。

【0064】そして、漸像担持体と中間転写体あるいは転写ベルトの接触傾斜は短いため、両者のニップ圧力は大きくなり、したがって、所願中抜けの転写不良も生じない。

【0065】

【発明の実施の形態】以下、本発明の各種形態につき、実施例を参照して詳細に説明する。図1はベルト状の中間転写体を用いた本発明によるカラー画像形成装置の第一実施例としてのカラープリンターの要部回路構造を説明する模式図であって、前記図18と同一符号は同一部分に対応し、6はコンタクトロール、7は一次転写電源、8は二次転写電源、15はトレー、16はビッキングアップロール、17はレジロールである。

【0066】図1において、感光体ドラム1の表面は帯電器13により所定の極性の電荷で一様に帯電され、1色の画像信号で変調されたレーザ光1の書き込み走査で上記第1色(例えば、イエロー)の画像に応じた静電層が形成される。この静電層は、感光体ドラム1の回転で現像装置14の設置位置に到り、第1色の現像器でトナー像とし、感光体ドラム1は下流されたトナー像を担持してさらに回転する。

【0067】上記トナー像動作に合わせて、中間転写ベルト2は感光体ドラム1の周速と略同速で移動し、感光体ドラム1と中間転写ベルト2とが当接する。一次転写部でトナー像が一次転写ロール3に一次転写電圧7から印加される上記トナーの帯電極性とは逆極性の転写電界により感光体ドラム1に担持されていたトナー像が中間転写ベルト2に一次転写される(一次転写サイク)。

4 実施例と同様であり、図8と同一符号は同一部分に對する。

【0099】本実施例によっても、前記実施例と同様に、転写ロールの振動が抑制され、かつプレニップ部でのブラーの発生が防止され、高画質の画像形成がなされる。

【0100】本実施例では、感光体ドラム11に形成した多色静電像を現像装置14でトナー現像し、これを転写ベルト2'に搬送して搬送される記録媒体111上に転写するための転写手段としてコロトロン3'を用いたものである。コロトロン3'はニップ部に中央から距離d(=2~4mm)下流に設置される。コロトロン3'は転写ベルト2'とは非接触であり、本実施例によっても、前記実施例と同様に転写ロールの振動が抑制され、かつプレニップ部でのブラーの発生が防止されて高画質の画像形成がなされる。

【0104】一方、記録媒体111はトレー15からピンクアップロール16により取り出され、レジロール17で待機している。感光体ドラム11が回転して、その表面に形成したトナー像の先端が転写ベルト2'とのニップ部に進入するタイミングに同期させて記録媒体111が上記ニップ部に進入するように上記レジロール17から開放されて搬入される。

【0105】各転写ロール3₁~3₄は転写ベルト2'の裏面に当該ニップ部中央から距離dだけ下流に配置されている。まず、転写ロール3₁で第1色のトナー像が転写された記録媒体111は、転写ベルト2'の搬送移動で第2色の感光体ドラム12と転写ベルト2'とのニップ部に至る。このとき、記録媒体111に転写されている第1色のトナー像の先端と上記第2色の感光体ドラム12に形成されたトナー像の先端とが一致するように転写ベルト2'の搬送速度と感光体ドラム12の周速が制御される。

【0106】以下、同様にして、第3色の感光体ドラム13に形成された第3色(マゼンタ)のトナー像、第4色の感光体ドラム14に形成された第4色(ブラック)のトナー像が転写ロール3₂~3₄によって先に転写されたトナー像にそれぞれ重ねて転写される。全てのトナー像の転写が終了した記録媒体111は、コロトロン19'により転写ベルト2'から剥離され、定着器20に渡されて加圧あるいは加熱/加圧処理されてトナーの固着が行われる。

【0107】定着された記録媒体111は排出トレー21に排出される。上記の構成において、各感光体ドラム11~14と転写ベルト2'のニップで形成される転写部に配置される転写ロール3₁~3₄は前記図9で説明したものと同様、各感光体ドラム11~14と転写ベルト2'とのニップ部分から、当該転写ベルト2'の搬送方向下流に距離dだけ離間した位置で転写ベルト2'の裏面に接触して配置されている。

【0108】この転写ロール3₁~3₄が転写ベルト2'と接触する位置では、当該転写ベルト2'と感光体ドラム11~14は離れて、前記実施例と同様にニップ幅が0.5~2mm程度であり、上記各ニップ部中央と転写ロール3₁~3₄との離間距離dは、2~4mm程度であり、転写ロール3₁~3₄の材料やサイズも前記実施例で説明したものと同様である。

【0109】本実施例によっても、転写ベルトと転写ロールの接触圧を大きくすることなく高画質の転写画像を得ることができる。また、転写ロールの振動が抑制され、かつプレニップ部でのブラーの発生が防止されて高

けの転写不良も生じない。また、前記実施例と同様に転写ロールの振動が抑制され、かつプレニップ部でのブラーの発生が防止され、高画質の画像形成がなされる。

【0093】図8は感光体ドラム11に形成したトナー像を記録媒体に直接転写する方式の画像形成装置に本発明を適用した本発明の第4実施例の要部構成を説明する模式図であって、1は感光体ドラム、2'は転写ベルト、3は転写ロールである。感光体ドラム11の回りには当該感光体ドラムの表面に一枚の電荷で帯電させるための増幅担持帯電器(コロトロン)13、感光体ドラム11に形成された増幅を現像する現像装置14、増幅担持帯電器14、転写ベルト2'は前記第1実施例と同様の材料で構成され、駆動ロール2a'、従動ロール2b'、テンションロール2c'に掛け渡されて矢印方向に搬送される。また、111は記録媒体であり、図示しないトレーから取り出された記録媒体111はレジロール17で待機し、感光体ドラム11に形成されたトナー像が転写ロール3が搬送された転写部(感光体ドラム11と転写ベルト2'の接触部：ニップ部)に回転して来るタイミングで同ニップ部に搬入される。

【0095】転写ロール3は、感光体ドラム11と転写ベルト2'とのニップ部分から、当該転写ベルト2'の搬送方向下流に距離dだけ離間した位置で転写ベルト2'の裏面に接触して配置されている。この転写ロール3が転写ベルト2'と接触する位置では、当該転写ベルト2'と感光体ドラム11は離間している。

【0096】上記ニップと転写ロール3との離間距離dは前記実施例と同様にニップ幅中央より0.5~2mm程度、転写ロール3'は感光体ドラム11と中間転写ベルト2との接触幅中央より2~4mm程度、転写ロール3'のサイズも前記実施例で説明したものと同様である。トナー像が転写された記録媒体111は定着器20に渡されて加圧あるいは加熱/加圧で定着される。

【0097】本実施例では、単色(ブラック：Bk)の画像形成で、複数トナー像を多重転写するものではないが、この構成とすることにより、転写ベルト2'に転写ロール3の接触圧を大きくすることなく高画質の転写画像を得ることができる。また、増幅担持帯電器と中間転写ベルト18により定着器20に搬入されて定着処理された後、排出トレー21に排出される。また、トナー像を記録媒体111に転写する際には、転写ロール3の接触圧を大きくせず、したがって、所願中抜けの転写不良も生じない。

【0098】また、前記実施例と同様に転写ロールの振動が抑制され、かつプレニップ部でのブラーの発生が防止されて高画質の画像形成がなされる。図9は感光体ドラム11に形成したトナー像を記録媒体に直接転写する方式の画像形成装置に本発明を適用した本発明の第5実施例の要部構成を説明する模式図であって、転写ロール3が転写ベルト2'と非接触で配置された点を除いて前記第

【0087】図7は本発明によるカラー画像形成装置の全体構成を説明する模式図であって、ベルト中央の中間転写体を用いた前記図1の構成を有するものである。なお、前記第三実施例、第四実施例に対応する画像形成装置全体構成は一次転写手段を除いて同様である。

図7において、40はレーザースキャン部、50は画像信号処理部、60は作像部、70は作像制御部である。

【0088】レーザースキャン部40はレーザ41、結像光学系42、走査光学系43、ミラー44からなり、レーザ41は画像信号処理部50で各種の補正等の信号処理を施した各色の画像信号で変調されたレーザ光1を照射する。作像部60は、感光体ドラム11、中間転写ベルト2、一次転写ロール3、二次転写ロール4を有し、感光体ドラムの周辺には増幅担持帯電器(コロトロン)13、カラー現像装置、増幅担持帯電器24、除電器25が設置されている。また、中間転写ベルト2は駆動ロール2a、従動ロール2b、テンションロール2d、およびバックアップロール5に駆動されて搬送移動する。

【0089】バックアップロール5にはコンタクトローラ6が接触回転するように配置されており、転写電源8→二次転写ロール4→記録媒体11と中間転写ベルト2の増幅部→バックアップロール5→コンタクトローラ6→接触に到る転写電流路を構成する。感光体11はカラー一面像を構成する各色のトナー像の最終トナー像が中間転写ベルト2上に一次転写された後、中間転写ベルト2は二次転写ロール4が配置されている二次転写部位に搬送されてくる。

【0090】一方、トレー15からは記録媒体11がピンクアップロール16により一枚取り出され、レジロール17で待機し、上記中間転写ベルト2に担持された多色トナー像が二次転写ロール4と中間転写ベルト2のニップ部に進入するタイミングで記録媒体111も同時に上記ニップ部に進入する。二次転写部では、転写電流から印加される二次転写電圧により、上記した転写電流路に転写電流が流れ、中間転写ベルト2に担持された多色トナー像を記録媒体111に一括して転写する。

【0091】多色トナー像が転写された記録媒体111は、剥離爪19で中間転写ベルト2から剥離され、記録媒体搬送ベルト18により定着器20に搬入されて定着処理された後、排出トレー21に排出される。また、トナー像を記録媒体111に転写する際には、転写ロール3の接触圧を大きくせず、したがって、所願中抜けの転写不良も生じない。

【0092】このように、中間転写ベルト上に多重転写した多色トナー像を記録媒体に良好に転写することができ、高品質のカラー画像を得ることができる。感光体ドラムと中間転写ベルトの接触領域は短いままなので、両者のニップ圧力は大きくならず、したがって、所願中抜け

面質の画像形成がなされる。図112は複数の感光体ドラムに形成した多色のトナー像を記録媒体に直接重ね転写する方式のカラー画像形成装置に本発明を適用した本発明の第八実施例の全体構成を説明する模式図であって、転写ローラ3₁、3₂が転写ベルト2'の裏面に對して非接触で配置された点を除いて、前記第七実施例と同様の構成である。

【0110】この実施例によっても、転写ベルトと転写ローラの接触圧を大きくすることなく高画質の転写画像を得ることができる。また、転写ローラの振動が抑制され、かつプレニップ部でのブラーの発生が防止されて高画質の画像形成がなされる。図113は複数の感光体ドラムに形成した多色のトナー像を記録媒体に直接重ね転写する方式のカラー画像形成装置に本発明を適用した本発明の第九実施例の全体構成を説明する模式図であって、転写手段としてコロトロンを用いた点を除いて前記第八実施例と同様であり、3'はコロトロン、図112と同一符号は同一部分に對する。

【0111】本実施例では、感光体ドラム1₂、1₄に形成した静電画像を現像装置14₁、14₂でそれぞれ色トナーでトナー現像し、これを転写ベルト2'に搬送して搬送される記録媒体11上に転写するための転写手段としてコロトロン3'を用いたものである。コロトロン3'はニップ部に中央から距離d(=2~4mm)の下流に設置される。コロトロン3'は転写ベルト2'とは非接触である。

【0112】この実施例によっても、転写ベルトと転写ローラの接触圧を大きくすることなく高画質の転写画像を得ることができる。また、前記実施例と同様にコロトロン3'での転写電圧に変動が生ぜず、かつプレニップ部でのブラーの発生が防止されて高画質の画像形成がなされる。以上説明した各実施例において、転写手段をニップ部の下流に設置し、かつベルト部材と接触させた転写ローラの場合には、転写ローラからベルト部材を通してニップ部に電流が流れ、当該ニップ部に形成される電圧により潜像担持体のトナー像を記録媒体に転写される。

【0113】また、ベルト部材の中では、転写ニップ部と転写ローラの間に転写電圧がかかっているため、転写直後のベルト部材上のトナーは剥離放電を受け、帯電料が増加する。なお、転写ローラをベルト部材に対して非接触で設置した場合も同様である。感光体ドラムと転写ローラをベルト部材に食い込ませると、感光体ドラムの振動や転写ローラの振動がベルト部材に伝わり、ベルト部材の駆動安定性が著しく悪化し、所謂バンディングの原因となる。

【0114】そのため、本発明では、ベルト部材と転写ローラとを感光体ドラムに對して略々接線上に配置し、上記の問題の発生を防止するものである。図114は転写ニップ部の圧力とパッチパターン(まだら模様:mott

tle)転写時の転写むらの関係の説明図であって、横軸はニップ部の圧力(ニップ圧)(g/cm)を、縦軸は転写むら(転写むら)のグレースケールを示す。

【0115】また、図115は転写ニップ部の圧力と転写むら(転写むら)のグレースケールを示す。図114の転写むら(転写むら)のグレースケールを、図115の転写むら(転写むら)のグレースケールに換算した点を除いて、前記第七実施例と同様の構成である。

【0116】感光体ドラムとベルト部材とのニップ圧を10乃至20g/cmに保つと、感光体ドラムとベルト部材とのニップ幅は0.5乃至2mmになる。このときのベルト部材のデフレーションは3乃至4k・fである。転写性の面から考えれば、感光体ドラムと転写ベルトとのニップ幅は0.5乃至2mmの範囲とするのが適当である。安定した転写を行うためには、ある程度のニップ幅が必要であり、0.5mm以上あればよいが、ニップ幅が広過ぎると転写時に画像歪れが発生する。これは、感光体ドラムとベルト部材とを完全に等速にすることは困難であり、ベルト部材と感光体ドラムとの速度差をもったまま幅広く接しているため、その接触域(ニップ幅)において画像歪れが生じる。

【0117】前記本発明の第10の発明に對する実施例では、感光体ドラムに對してベルト部材を予め非接触状態にしておき、転写ローラでベルト部材を持ち上げることで、感光体ドラムにベルト部材と接触させる構成により、感光体ドラムとベルト部材とをニップ圧に對して非接触で設置し、転写手段をニップ部の下流に設置し、かつベルト部材と接触させた転写ローラの場合には、転写ローラからベルト部材を通してニップ部に電流が流れ、当該ニップ部に形成される電圧により潜像担持体のトナー像を記録媒体に転写される。

【0118】図118(a)に示したように、ベルト部材2は時ローラ2a、2bに掛け渡された状態で感光体ドラム1とは非接触の位置にある。その後、転写ローラ3を組み付けるときに当該転写ローラ3でベルト部材2を感光体ドラム方向に持ち上げて、当該ベルト部材を感光体ドラム1に接触させる。

【0119】図119(b)に示されたように、感光体ドラムとベルト部材とのニップ幅の最長範囲は0.5乃至2mmであるが、そのニップ幅を保つことは困難である。例えば、直径8mmの感光体ドラムを用いた場合、上記のニップ幅を維持するためには感光体ドラムへのベルト部材の食い込み量が0.01以下にする必要がある。【0120】図117はベルト部材に對して転写手段を非接触で設置する場合の両者の間の距離設定を規定したための当該設置間隔とブレードクダウン電圧(放電電圧:V/mm)の関係の説明図である。同図は、ベルト部材

(中間転写ベルト、転写手段)と転写手段(転写ローラ、コロトロン)を非接触で設置した場合の距離設定の様相を説明するもので、ベルト部材と転写手段との間に形成する電圧は10V/μm程度が適正である。

【0121】上記間隔が小さい程、上記の電圧を維持するための転写手段に印加する転写電圧は低く済む。しかし、上記の電圧を維持して両者の間隔を100μm以上にとると、転写手段に印加する電圧は1kVを超えてしまい、転写手段からベルト部材に放電が生じ、画像が乱れてしまう。

【0122】したがって、ベルト部材に転写ローラを非接触で配置した場合、両者の間隔を100μm以下とする必要がある。転写手段をコロトロンとしたとき、コロトロン放電するコロトロンとベルト部材との間隔公差は大きくなら、4乃至10mmとなる。ただし、プレニップ部へのコロトロン放電の広がりを阻止するために、当該コロトロンの上流側放電部にパッチングを取り付ける必要がある。

【0123】ところで、転写手段として転写ローラを用いる場合は、金属ローラとの通過している。上記したベルト部材との間隔を100μm以下の精度に保つには加工精度が高いく、金属製のローラを転写ローラとするのが良く、その直径は20mm以下が最適であり、材質としてはアルミニウム、あるいはステンレス(SUS)が使用できる。

【0124】また、この金属ローラの表面を高抵抗樹脂膜で被覆してもよい。高抵抗樹脂膜で表面を被覆すると、放電現象が発生し難くなる。上記の高抵抗樹脂膜としては、PFA、PVDF、ナイロン、PC(ポリカーボネート)が適しており、上記高抵抗樹脂膜の被覆厚は30乃至1000μm、体積抵抗は10⁴乃至10⁹Ω・cm程度である。

【0125】なお、ベルト部材が中間転写ベルトである場合の当該中間転写ベルトの表面抵抗は10¹¹乃至10¹³Ω/□が適当である。10¹¹Ω/□未満では電荷保持特性が良くなく、画質劣化をもたらす。また、10¹³Ω/□を超えると、転写手段から転写ニップ部への電流が流れ難くなり、適正な転写が出来なくなる。

【0126】【発明の効果】以上説明したように、本発明によれば、潜像担持体上に形成した未定着トナー像を直接あるいは中間転写媒体に転写する画像形成装置において、転写ローラの振動が抑制され、かつプレニップ部でのブラーの発生が防止されて高画質の画像形成がなされ、とくに、多色の重ね転写を行う画像形成装置では、多色転写されるトナー像の帯電量の違いに起因する転写むらや転写不足等の転写問題を解消して、高画質の転写画像を得ることができ、

【図面の簡単な説明】

【図1】ベルト状の中間転写体を用いた本発明による

カラー画像形成装置の第一実施例としてのカラープリンターの要部概略構造を説明する模式図である。

【図2】ベルト状の中間転写体を用いた本発明によるカラー画像形成装置の一次転写部分の詳細構成を説明する要部概略式図である。

【図3】ベルト状の中間転写体を用いた本発明によるカラー画像形成装置の第二実施例としてのカラープリンターの要部概略構造を説明する模式図である。

【図4】第二実施例の一次転写部分の詳細構成を説明する要部概略式図である。

【図5】ベルト状の中間転写体を用いた本発明によるカラー画像形成装置の第三実施例としてのカラープリンターの要部概略構造を説明する模式図である。

【図6】第三実施例の一次転写部分の詳細構成を説明する要部概略式図である。

【図7】本発明によるカラー画像形成装置の全体構成を説明する模式図である。

【図8】感光体ドラムに形成したトナー像を記録媒体に直接転写する方式の画像形成装置に本発明を適用した本発明の第四実施例の要部構成を説明する模式図である。

【図9】感光体ドラムに形成したトナー像を記録媒体に直接転写する方式の画像形成装置に本発明を適用した本発明の第五実施例の要部構成を説明する模式図である。

【図10】感光体ドラムに形成したトナー像を記録媒体に直接転写する方式の画像形成装置に本発明を適用した本発明の第六実施例の要部構成を説明する模式図である。

【図11】複数の感光体ドラムに形成した多色のトナー像を記録媒体に直接重ね転写する方式のカラー画像形成装置に本発明を適用した本発明の第七実施例の全体構成を説明する模式図である。

【図12】複数の感光体ドラムに形成した多色のトナー像を記録媒体に直接重ね転写する方式のカラー画像形成装置に本発明を適用した本発明の第八実施例の全体構成を説明する模式図である。

【図13】複数の感光体ドラムに形成した多色のトナー像を記録媒体に直接重ね転写する方式のカラー画像形成装置に本発明を適用した本発明の第九実施例の全体構成を説明する模式図である。

【図14】転写ニップ部の圧力とパッチパターン(まだら模様:mottle)転写時の転写むらの関係の説明図である。

【図15】転写ニップ部の圧力と中抜け転写むらの関係の説明図である。

【図16】本発明の第10の発明に對する実施例の概略の説明図である。

【図17】ベルト部材に對して転写手段を非接触で設置する場合の両者の間の距離設定を規定するための当該

設置間隔とブレードダウン電圧（放電電圧： $V/\mu m$ ）の関係の説明図である。

【図18】 ベルト部材としてベルト状中間転写体を用いた画像形成装置の一例としてのカラーブリンターの主要部構成を説明する模式図である。

【図19】 中間転写ベルト上の一次転写サイクルにおける第1色（イエロー）のトナー像の帯電量の推移の説明図である。

【図20】 中間転写ベルト上のトナー帯電量と最速二次転写電圧の関係の説明図である。

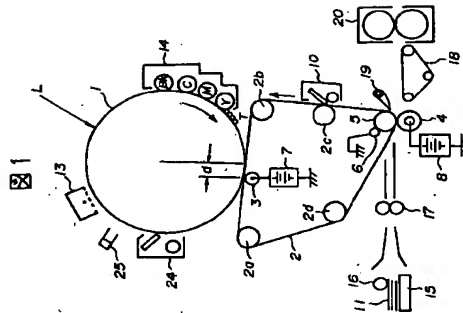
【図21】 従来技術に開示された一次転写部における感光体ドラムと中間転写ベルトおよび一次転写ロールの位置関係を説明する模式図である。

【図22】 中間転写ベルトと感光体ドラムとのニップ圧力と転写品質との関係の説明図である。

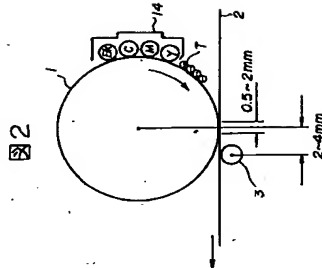
【符号の説明】

- 1・・・普像担持体（感光体ドラム）、2・・・ベルト部材（中間転写体ベルト、転写ベルト、記録媒体搬送ベルト）、2aは駆動ロール、2b、2c・・・従動ロール、2d・・・テンションロール、3・・・一次転写ロール、3'・・・コトロロン、4・・・二次転写ロール、5・・・バックアップロール、6・・・コンタクトロール、7・・・一次転写電源、8・・・二次転写電源、10・・・中間転写ベルトリナー、11・・・転写紙等の記録媒体、13・・・帯電器、14・・・（カラー）現像装置、17・・・レジロール、18・・・記録媒体搬送ベルト、19・・・剥離爪、20・・・定着器、21・・・排出トレイ、24・・・感光体ドラムクリーナー、25・・・除電器。

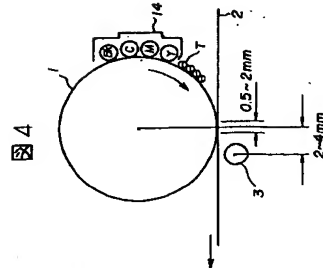
【図1】



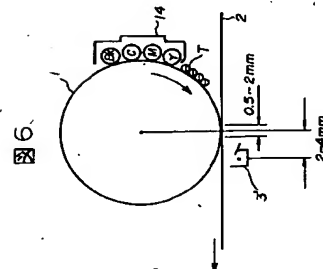
【図2】



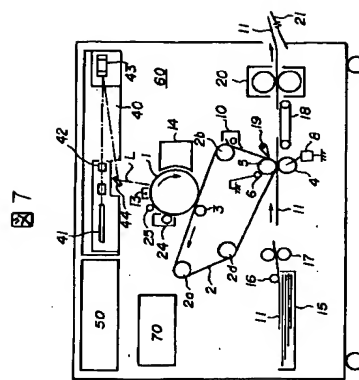
【図4】



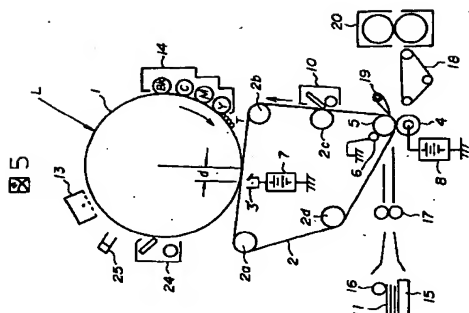
【図6】



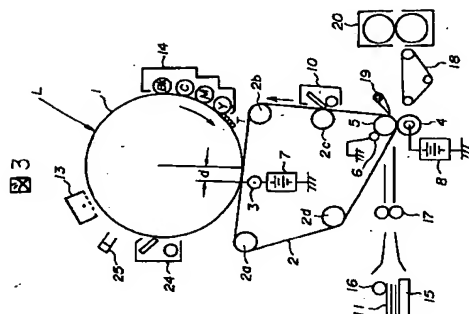
【図7】



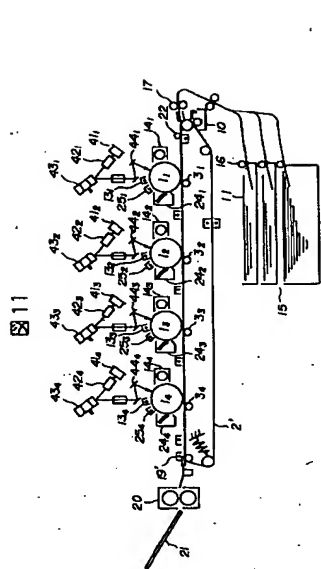
【図5】



【図3】

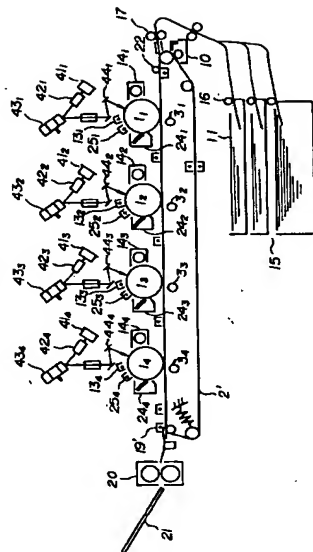


【図11】

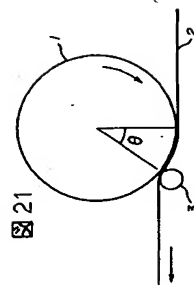


【図12】

図12

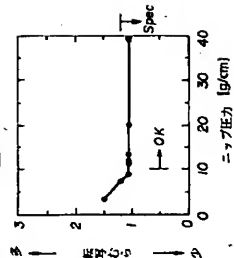


【図21】



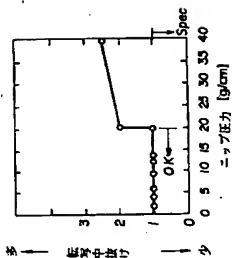
【図14】

図14



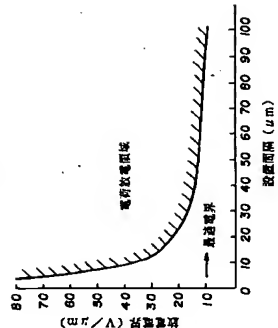
【図15】

図15



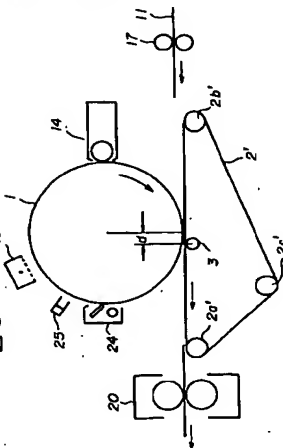
【図17】

図17



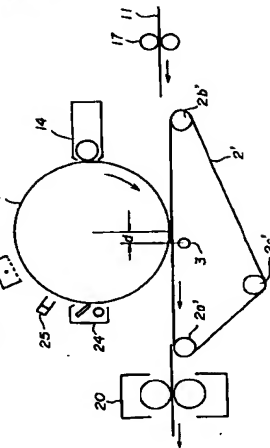
【図8】

図8



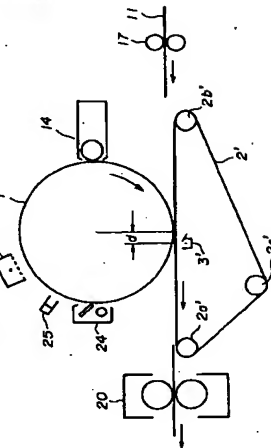
【図9】

図9



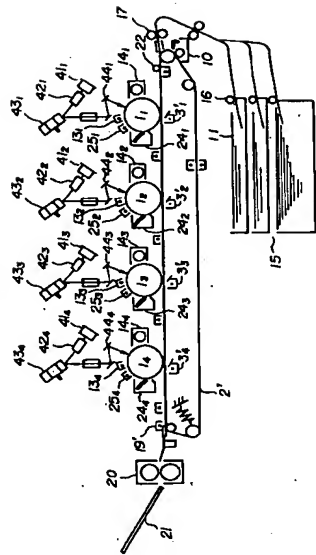
【図10】

図10



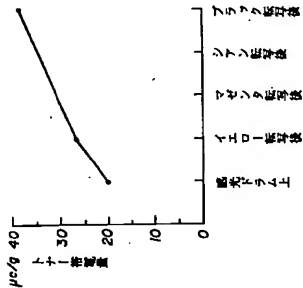
【図13】

図13



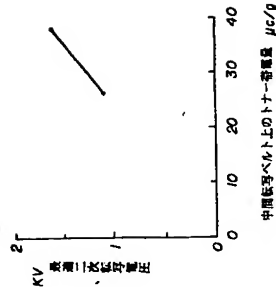
【図19】

図19



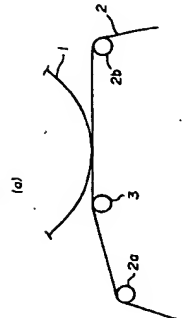
【図20】

図20



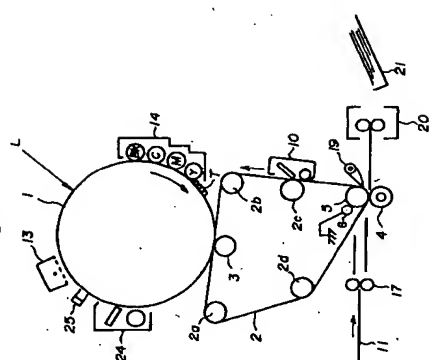
【図16】

図16



【図18】

図18



【図22】

図22

